

(14.)



ON THE  
CRUSTACEA  
COLLECTED DURING THE  
“SKEAT EXPEDITION”

TO THE  
MALAY PENINSULA,  
TOGETHER WITH A  
NOTE ON THE GENUS *ACTÆOPSIS*.

PART I.

BY  
W. F. LANCHESTER, M.A.,  
KING'S COLLEGE, CAMBRIDGE.

---

[From the PROCEEDINGS OF THE ZOOLOGICAL SOCIETY OF LONDON,  
December 3, 1901.]

---

On the Crustacea collected during the "Skeat" Expedition to the Malay Peninsula, together with a Note on the Genus *Actæopsis*. By W. F. LANCHESTER, M.A., King's College, Cambridge<sup>1</sup>.

PART I.—BRACHYURA, STOMATOPODA, AND MACRURA.

(Plates XXXIII. & XXXIV.<sup>2</sup>)

Owing to the number of species that are represented, through the different groups, in the Crustacea collected by the "Skeat" Expedition, I have thought it best to divide the account of them into two parts: the present paper dealing with the groups mentioned above, the second paper to deal with the remaining groups—namely, the Anomura, Arthrostraca, and Cirripedia.

The present part deals systematically with 90 species, comprised in 48 genera, so that the collection may be seen to be very fairly representative; though the Oxyrhyncha, among the Brachyura, are represented but poorly and the Leucosiid group of the Oxystomata not at all. Of these 90 species, moreover, I have found it necessary to describe 6 as new—2 among the Brachyura, 4 among the Macrura,—and to refer 2 forms among the Macrura to new varieties of already-known species. Further, I will note that 50 of the species were obtained from localities on the east coast of the Peninsula, 29 from the west coast, 5 from localities on either coast (*i. e.*, common to both), and 6 of uncertain locality. The small number of forms common to both coasts is not surprising; from two more closely situated localities, Singapore and Malacca, I myself only succeeded in obtaining 12 common forms out of 120 species of crabs, and this I believe to be due very largely to the differing nature of the sea-bottom, currents, &c., in different parts of the same large area. Not that I wish to give undue prominence to this particular reason: the amount of time spent or the facilities available in different localities are varying; and, if I may judge from my own experience, there is a disposition in the collector not to overload his probably limited stock of bottles with specimens he remembers to have already collected elsewhere. These causes may easily bring it about that the number of "common" forms is apparently so small. Notwithstanding this, however, I am inclined to think that the smallness of the number is not entirely apparent, but in part real; and what I would point out is that the value of any collection from a given area would be greatly enhanced were a species, or better a group of species, dealt with distributionally, so that each specimen, or group of specimens, collected might be accompanied by notes on the points I have mentioned above (*i. e.*, all details of habitat), in addition to the note of simple locality. For, besides the broad areas of distribution that may be peculiar to a species, there are again

<sup>1</sup> Communicated by Dr. S. F. HARMER, F.Z.S.

<sup>2</sup> For explanation of the Plates, see p. 574.

smaller areas within the broad areas, and still smaller areas (habitats) within these, peculiar to that species; and it is these smallest, quite local, areas to which attention needs to be directed in order to elucidate the causes of confinement to a special habitat, or, on the other hand, to answer the question: Does the same species adopt the same habitat in different distributional areas? I have already noted (P. Z. S. 1900, "On Crustaceans from Singapore and Malacca") how certain Leucosiids were obtained there from mud which had been found by Adams and White ('Samarang' Crustacea) in the China Sea on a clean sandy or rocky bottom. Such a difference of habitat is most striking and seems to me to require explanation: this explanation, however, can hardly be arrived at until more data of a similar kind are forthcoming.

I have taken my measurements of length and breadth in a similar way to those given in my paper already cited (*vide* P. Z. S. 1900, p. 720). In those cases, however, in which no supraocular or praocular spine is present (Macrura &c.) I have measured from the upper internal angle of the orbit. The units are in millimetres, and the first figure given in each case stands for the breadth.

### I. Genus DOCLEA Leach.

#### 1. DOCLEA CANALIFERA Stimpson.

*Doclea canalifera*, Stimpson, Proc. Ac. Nat. Sci. Philad. p. 217 (1857); Alcock, Journ. As. Soc. Beng. lxiv. 2, p. 228 (1896).

*Loc.* Pulau Bidan, Penang.

A single male; all the legs absent.

This individual agrees closely with Major Alcock's description; but there are two small points which may be noticed in connection with it, as neither Major Alcock nor Stimpson make any mention of them. On the gastric region are "some minute tubercles followed by a spine." The number of the tubercles here in front of the spine is five, of which the two anterior lie transversely close to each other, exactly at the level of the back of the orbits, each tubercle corresponding to one of the posteriorly coalesced rostral spines, the distinction of the two being still indicated at this level.

Besides the oblique line of tubercles on the hepatic region, moreover, there may be seen three more in front of this line, one in front of, and the other two (transversely placed) behind, the level of the first lateral spine.

*Dim.*  $23 \times 25.5$ .

### II. Genus SCHIZOPHRYYS White.

#### 2. SCHIZOPHRYYS ASPERA M.-Edw.

*Mithrax aspera*, M.-Edw. Hist. Nat. Crust. i. p. 320 (1834).

*Dione affinis*, de Haan, Crust. Japon. p. 94, pl. xxii. fig. 4 (1839).

*Schizophryys aspera*, A. M.-Edw. Nouv. Arch. Mus. viii. p. 231, pl. x. fig. 1 (1872); Hasw. Cat. Austr. Crust. p. 22 (1881).

*Loc.* Pulau Bidan, Penang.

A female.

The points of the rostral horns are sharply curved upwards and inwards in this specimen. A typical form, with a single spinule at the base of each rostral spine.

*Dim.*  $22 \times 25$ .

Breadth taken between bases of *penultimate* lateral teeth.

### III. Genus HYASTENUS White.

#### 3. HYASTENUS DIACANTHUS de Haan.

*Pisa (Naxia) diacantha*, de Haan, Crust. Jap. p. 86, pl. xxiv. fig. 1 (1839).

*Hyastenus diacanthus*, Miers, 'Alert' Crust. p. 194 (1884); de Man, Arch. f. Naturg. liii. i. p. 220 (1887); Alcock, Journ. As. Soc. Bengal, lxiv. 2, p. 210 (1896).

*Loc.* Trengganu.

A fine female with ova.

Carapace creamy-coloured, splashed with red; two, quite low, tubercles on the gastric eminence, one in front of the other, and a very low one, hardly distinct, on the uro-cardiac region. Also another low tubercle, situate on the anterior branchial region a little in front of a line joining the epibranchial spine and posterior gastric tubercle, and lying a little nearer the former than the latter.

*Dim.*  $26.5 \times 34.5$ .

### IV. Genus MICIPPA Leach.

#### 4. MICIPPA MASCARENICA Kossmann.

*Micippa philyra*, Leach, Zool. Misc. iii. p. 16 (1817) (nec *M. philyra*, Herbst).

*Micippa philyra*, var. *mascarenica*, Kossm. Zool. Ergebni. p. 7, pl. iii. fig. 2 (1877).

*Micippa mascarenica*, Miers, Ann. Mag. Nat. Hist. (5) xv. p. 7 (1885); Lanchester, P. Z. S. Lond. p. 725 (1900).

*Loc.* Pulau Bidan, Penang.

A full-grown male; of the legs only one chelipede remains. There are six teeth present behind the postorbital tooth. Mobile portion of antenna a little less than half the length of the carapace, second joint just one-quarter breadth of rostrum at its own point of origin. The single chelipede is quite smooth, except for a few separate and minute granules on the distal portion of the upper margin of the arm. The fingers meet along their distal half.

*Dim.*  $24 \times 28$ .

Breadth taken between bases of *penultimate* lateral teeth.

### V. Genus LAMBRUS Leach.

#### 5. LAMBRUS LONGIMANUS Linn.

*Cancer longimanus*, Linn. Syst. Nat. (ed. xii.) p. 1047 (1766).

*Lambrus longimanus*, M.-Edw. Hist. Nat. Crust. i. p. 354 (1834); Miers, Ann. Mag. Nat. Hist. (5) iv. p. 20 (1879); Alcock, Journ. As. Soc. Beng. lxiv. 2, p. 260 (1896).

*Loc.* Kota Bharu, Kelantan.

Two males.

*Dim.* 2 ♂♂ 28·5 × 25.

6. *LAMBRUS LIPPUS*, sp. n. (Pl. XXXIII. fig. 1.)

*Loc.* —? A male.

A *Lambrus* with the walking-legs perfectly smooth, merus and carpus rounded, propodus flattened. Carapace raised into four prominences—one on the gastric region, one on the cardiac, and one on each branchial. The gastric prominence is flattened above; the cardiac is rather globular, bluntly pointed above; each branchial forms an oblique ridge with very rounded upper edge. Each of these prominences is covered with flattened raspberry-like granules; and each branchial bears, moreover, a large rounded tubercle at the middle of its upper edge and a tall pedicled tubercle, quite smooth, at the hinder portion of its upper edge where the prominence ends, falling quite abruptly straight down to the postero-lateral border of the carapace above the base of the third pair of walking-legs. The depressions between these prominences are deep, rather smooth, with scattered similar granules. The rostrum is very prominent, vertically thick, with the tip slightly deflexed, its upper surface deeply excavate as far back as the gastric prominence, its sides coarsely wrinkled. Sides of carapace edged with low raspberry-like tubercles, which are more distinct behind; just in front of the middle of the border is a deepish cleft, which continues on to the carapace as a shallow basin-like hollow. Pterygostomian regions flattened and smooth, but with a line of tubercles parallel with, and similar to, those on the antero-lateral border.

Chelipedes very long, with prominent granular tubercles, of varying size, on their anterior and posterior borders, and much lower similar tubercles on their lower borders. Upper surface of arm with a prominent row of these tubercles, nearer the posterior margin than the anterior; proximal half of the upper surface of the hands with a similar row in a similar position, continued distally, quite suddenly, as a double row of small tubercles. General upper surface otherwise smooth; general under surface also smooth, but with more frequent separate tubercles, which tend to be arranged in longitudinal rows.

Sternal surface with irregularly scattered smooth granules, one much larger on each side at the base of the chelipedes. Abdomen with occasional smooth granules and a conical spine on the penultimate joint.

*Dim.* 40 × 34.

VI. Genus *CRYPTOPODIA* M.-Edw.

7. *CRYPTOPODIA FORNICATA* Fabr.

*Cancer fornicatus*, Fabr. Ent. Syst. ii. p. 453 (1781).

*Cryptopodia fornicata*, M.-Edw. Hist. Nat. Crust. i. p. 362 (1834); de Haan, Crust. Japon. p. 90, pl. xx. fig. 2 (1839); Hasw. Cat. Austr. Crust. p. 37 (1882).

*Loc.* Kota Bharu, Kelantan.

A female with ova. The posterior portion of the upper and under surfaces of the carapace are covered by an encrusting Polyzoan, and the tube of a worm is to be seen on the under surface about the level of the chelipedes.

*Dim.*  $54.5 \times 31.5$ .

## VII. Genus ATERGATIS de Haan.

### 8. ATERGATIS INTEGERRIMUS Lam.

*Cancer integerrimus*, Lam. Hist. An. sans Vert. v. p. 272 (1818).

*Atergatis integerrimus*, de Haan, Crust. Japon. p. 45, pl. xiv. fig. 1 (1839); Alcock, Journ. As. Soc. Bengal, lxvii. 2, p. 95 (1898).

*Loc.* Pulau Bidan, Penang.

Four males and a female.

The characters given by Major Alcock as distinguishing this species from *A. dilatatus* de Haan are not entirely satisfactory. I have examined two dried specimens in the Natural History Museum, however, which exhibited this distinction of characters very well, excepting that both species possessed comb-like bristles on the ischia and meri of the legs. Major Alcock's four examples, moreover, of *A. dilatatus* were quite distinct. But in dealing with the present individuals, although I can unhesitatingly refer them to Lamarck's species, still I find them in some instances presenting characters referred by Major Alcock to *A. dilatatus*. Of these characters two are very well marked. The one is the presence of the comb-like bristles to which I have referred in the case of the Natural History Museum specimen, which occurs in four out of the five individuals; the other is the dense hairiness of the outer surface of the third maxillipedes, which is found in two instances, while in two others I should describe this surface as moderately hairy.

I was able to find only one specimen of *A. dilatatus* at the Natural History Museum, judging from which I should say that the most marked points of difference between the two species were the much closer pitting of carapace and legs, amounting even to faint rugosity, and the crowded confluent granules on the sternum in *A. dilatatus*; the greater relative breadth of the latter may also be taken into account. As regards the greater or less definition of the cardiac region, it may be said that there is a slight variation in this respect in these examples, though in none is the region really well defined.

*Dim.* ♂  $40 \times 24$ . ♂  $34 \times 20.5$ . ♂  $33 \times 20$ . ♂  $30.5 \times 18.5$ . ♀  $41 \times 25$ .

### 9. ATERGATIS FLORIDUS (Rumph.).

*Cancer floridus* Rumph., D'Amboin. Rariteitkamer, p. 16, pl. viii. fig. 5 (1741); de Haan, Crust. Japon. p. 46 (1839).

*Atergatis floridus*, de Man, Merg. Crust. p. 24 (1888); id. Zool. Jahrb. Syst. viii. p. 498 (1895).

*Loc.* One very damaged male, just moulted, from Kelantan.  
One male and three females from Pulau Bidan, Penang.

*Dim.* ♂  $24 \times 34.5$ . ♀  $30.5 \times 44$ . ♀  $28 \times 40.5$ . ♀  $20 \times 28$ .  
Breadth taken is greatest breadth.

#### 10. ATERGATIS ROSEUS Rüpp.

*Carpilius roseus, marginatus*, Rüpp. Beschreib. 24 Krabben, p. 13, pl. iii. fig. 3 (1830).

*Atergatis roseus*, Kossm. Zool. Ergebni. pp. 19–21 (1877); Lanchester, P. Z. S. Lond. p. 730 (1900).

*Loc.* Pulau Bidan, Penang.

Four males.

These all belong to Kossmann's variety *scrobiculatus*. In the two smallest the white portion is margined with a red line close to and in line with the external edge of the sides and front; in the other two this line is present but very faint. In the two smallest examples the red colour of the carapace is lighter, with a tendency to cream-yellow.

*Dim.*  $19.5 \times 12$ .  $15 \times 9$ .  $14 \times 7.75$ .  $5.5 \times 3$ .

Breadth taken is greatest breadth.

#### VIII. Genus CHLORODIUS Rüpp.

##### 11. CHLORODIUS NIGER Forskål.

*Cancer niger*, Forsk. Descr. Auim. p. 89 (1775).

*Chlorodius niger*, de Man, Merg. Crust. p. 32 (1888); id. Zool. Jahrb. Syst. viii. p. 519 (1895).

*Loc.* Kelantan.

A male, damaged; only carapace and right chela present. There are five teeth on the antero-lateral margins, including the external orbital angle; the last of these is obtusely spiniform on the left side, but not on the right.

*Dim.*  $12 \times 8$ .

#### IX. Genus CHLORODOPSIS.

##### 12. CHLORODOPSIS MELANOCHIRUS A. M.-Edw.

*Chlorodopsis melanochirus*, A. M.-Edw. Nouv. Arch. Mus. ix. p. 228, pl. viii. fig. 5 (1873); de Man, Arch. Naturg. liii. i. p. 281 (1887); Hasw. Cat. Austr. Crust. p. 55 (1882).

*Loc.* Kelantan.

Five males and four females, the latter all bearing ova. They are in a very broken state, a great many of the legs being missing. Six of the chelipeds are present, three from the right and three from the left side, and in these I note the following two points:—

a. The presence, in all, of 4–5 whitish spines on the posterior border of the arms. These are closely similar to those on the antero-lateral borders; they are, however, easily overlooked while the chelipeds are yet attached to the carapace, both through the nature of the background and the presence of longish brown hairs on the border.

b. In only one does the black colour of the fingers extend

laterally and beneath to the neighbourhood of the carpal articulation; in the others it reaches quite a little way on to the lower border of the hand.

*Dim.* ♂  $10 \times 7$ . ♂  $10\cdot25 \times 7$ . ♂  $10 \times 7$ . ♂  $9\cdot5 \times 6\cdot5$ .  
 ♂  $7 \times 5$ . ♀  $10 \times 7$ . ♀  $10 \times 7$ . ♀  $7\cdot5 \times 6$ . ♀  $8 \times 5\cdot5$ .

#### X. Genus LEPTODIUS A. M.-Edw.

##### 13. LEPTODIUS EXARATUS M.-Edw.

*Chlorodius exaratus*, M.-Edw. Hist. Nat. Crust. i. p. 402 (1834).  
*Xantho affinis*, de Haan, Crust. Japon. p. 48, pl. xiii. fig. 8 (1839).

*Leptodus exaratus*, A. M.-Edw. Nouv. Arch. Mus. ix. p. 222 (1873); de Man, Zool. Jahrb. viii. p. 521 (1895).

*Loc.* Pulau Bidan, Penang.

Two males and a female.

*Dim.* ♂  $16 \times 10\cdot5$ . ♂  $14\cdot5 \times 10$ . ♀  $10 \times 7$ .

##### 14. LEPTODIUS CAVIPES Dana.

*Chlorodius cavipes*, Dana, U.S. Expl. Exp. p. 212, pl. xii. fig. 1 (1852); de Man, Mergui Crust. p. 34 (1888); Alcock, Journ. As. Soc. Bengal, lxvii. 2, p. 122 (1898).

*Loc.* Pulau Bidan, Penang.

A male and a small female.

The "wrinkling" on the chelipedes in the male tends to the formation of deepish wide-mouthed pits on the carpus and to a slight degree on the upper margin of the hand. In the female the two lobes of the front are much more prominent near the middle line than at the sides, giving it a cupid's-bow-shaped appearance; the grooves, too, on the sides of the carapace are more marked than in the male.

*Dim.* ♂  $20\cdot5 \times 13\cdot5$ . ♀  $13\cdot5 \times 9$ .

#### XI. Genus XANTHO Leach.

##### 15. XANTHO SCABER Fabr.

*Cancer scaber*, Fabr. Ent. Syst. Suppl. p. 336 (1798).

*Xantho scaber*, M.-Edw. Hist. Nat. Crust. p. 390 (1834).

*Loc.* Kelantan.

One male.

This single individual agrees entirely with the descriptions cited, so far as they go. The tubercles on the middle regions of the carapace are smooth and rounded, on the sides and front they become conical; those on the outer faces of the wrists and hands are rounded, but larger than those on the middle regions of the carapace, and pointed tubercles are present on the upper borders of the carpus and propodus of the walking-legs. The pterygostomian regions are covered with rather flattened granules and are deeply grooved, the grooves being continuous with those between the ill-defined lateral teeth; these latter are four in number, of

which the last is more pointed and more clearly defined than the others. The carapace and the outer face of the wrists and hands of the chelipedes are clothed with short bristles between and around the tubercles, thickly on the chelipedes, but very scantily on the carapace; these bristles are also placed rather thickly on the upper borders of the carpus and propodus of the walking-legs. Other finer and somewhat longer hairs are scattered over the whole animal, noticeably on the upper borders of the meropodites of all the legs. The inner faces of the chelipedes and lower faces of the legs are quite smooth, except for a few hairs. General colour, in formol, pinkish red blotched with bluish white.

*Dim.*  $35 \times 27$ .

### XII. Genus EPIXANTHUS Heller.

#### 16. EPIXANTHUS FRONTALIS M.-Edw.

*Ozius frontalis*, M.-Edw. Hist. Nat. Crust. i. p. 406 (1834).

*Epixanthus frontalis*, A. M.-Edw. Nouv. Arch. Mus. ix. p. 241 (1873); Alcock, Journ. As. Soc. Bengal, lxvii. 2, p. 185 (1898).

*Loc.* —?

Two males.

*Dim.*  $29.5 \times 18$ .  $20.5 \times 13$ .

### XIII. Genus ACTUMNUS Dana.

#### 17. ACTUMNUS SETIFER de Haan.

*Cancer (Pilumnus) setifer*, de Haan, Crust. Japon. p. 50, pl. iii. fig. 3 (1839).

*Actumnus setifer*, A. M.-Edw. Nouv. Arch. Mus. i. p. 287, pl. xviii. fig. 5 (1865); Miers, 'Alert' Crust. p. 225 (1884).

*Loc.* Pulau Bidan, Penang.

A male.

*Dim.*  $20 \times 15$ .

### XIV. Genus PILUMNUS Leach.

#### 18. PILUMNUS VESPERTILIO Fabr.

*Cancer vespertilio*, Fabr. Ent. Syst. Suppl. p. 338 (1798).

*Pilumnus vespertilio*, M.-Edw. Hist. Nat. Crust. i. p. 418 (1834); Alcock, Journ. As. Soc. Bengal, lxvii. 2, p. 192 (1898).

*Loc.* Kelantan. Two from Pulau Bidan, Penang.

Twenty males and twenty-four females, one of the latter with ova.

*Dim.* ♂  $19.5 \times 15$ . ♂  $24 \times 19$ . ♂  $23 \times 17$ . ♂  $18 \times 4$ .  
 ♂  $13.75 \times 10$ . ♂  $10 \times 7$ . ♀  $20 \times 15.5$ . ♀  $18 \times 13$ . ♀  $16 \times 12$ .  
 ♀  $16 \times 11.5$ . ♀  $13.5 \times 9$ . ♀ with ova  $20 \times 15.5$ .

#### 19. PILUMNUS SLUITERI de Man.

*Pilumnus sluiteri*, de Man, Weber's Zool. Ergebni. ii. p. 283, pl. i. fig. 2 (1892); Alcock, Journ. As. Soc. Bengal, lxvii. 2, p. 194 (1898).

PROC. ZOOL. SOC.—1901, VOL. II. NO. XXXVI. 36

*Pilumnus forskalii*, de Man (nec Edw.), Arch. f. Naturgesch. liii. p. 295, pl. xii. fig. 1 (1887).

*Loc.* Pulau Bidan, Penang.

A male and a female.

The carpopodites of the last four pairs of legs in these two individuals have each a shallow, but very distinct, groove on their upper outer surfaces.

*Dim.* ♂  $31 \times 24$ . ♀  $30.5 \times 23.5$ .

#### 20. PILUMNUS LÆVIMANUS Dana.

*Pilumnus lœvimanus*, Dana, U.S. Expl. Exp. Crust. i. p. 237, pl. xiii. fig. 11 (1852); A. M.-Edw. Nouv. Arch. Mus. ix. p. 250, pl. x. fig. 4 (1873); de Man, Arch. f. Naturg. liii. i. p. 301 (1887).

*Loc.* Kelantan.

A small damaged male.

The right chelipede only is present; on the proximal half of the anterior border of the merus are three or four minute, but sharp, teeth as in *P. nitidus*, but none on the posterior border, which, however, terminates in a very blunt low tooth a little before the carpal articulation. The hairy growth on the proximal portion of the hand is continued over the joint on to the external surface of the carpus.

*Dim.*  $5.5 \times 3$ .

#### 21. PILUMNUS NITIDUS A. M.-Edw.<sup>1</sup>

*Pilumnus nitidus*, A. M.-Edw. Nouv. Arch. Mus. ix. p. 249, pl. x. fig. 2 (1873); de Man, Arch. f. Naturg. liii. i. p. 305 (1887).

*Loc.* Kelantan.

A single female, rather damaged.

Besides the granular teeth on its anterior margin, the meri of the chelipedes bear on their rather sharp posterior margin 4–5 inconspicuous blunt teeth, the most distal of which is sharper and more prominent than the others, and is placed about 1 mm. behind the carpal articulation.

*Dim.*  $10 \times 7.5$ .

### XV. Genus ERIPHIA Latr.

#### 22. ERIPHIA LÆVIMANA, var. SMITHII McLeay.

*Eriphia smithii*, McL. Annulosa in Smith's Illustr. Zool. S. Afr. p. 60 (1838).

*Eriphia lœvimana*, var. *smithii*, Hilg. Monatsber. Ak. Berlin, p. 797 (1878); Miers, Ann. Mag. Nat. Hist. (5) v. p. 237 (1880).

*Loc.* Pulau Bidan, Penang.

Seven males and twelve females.

*Dim.* ♂  $52.5 \times 38$ . ♂  $51 \times 38$ . ♂  $51 \times 37$ . ♂  $49.5 \times 37.5$ .

<sup>1</sup> I have since found that this form should be referred to Dana's *Pseudozius dispar*, with which *P. nitidus* is synonymous (*vide* Calman, Trans. Linn. Soc. ser. 2, Zool. viii. p. 14, 1900).

$\delta\ 47 \times 34.$   $\delta\ 47 \times 33.$   $\delta\ 40 \times 28.$   $\varphi\ 60 \times 43.5.$   $\varphi\ 58 \times 42.5.$   
 $\varphi\ 57 \times 43.$   $\varphi\ 46 \times 34.$   $\varphi\ 43 \times 30.5.$   $\varphi\ 32.5 \times 23.$

Breadth taken is *greatest* breadth.

### XVI. Genus CYMO de Haan.

#### 23. CYMO ANDREOSSYI Aud.

*Pilumnus ? andreossyi*, Audouin, Descr. de l'Egypte, p. 86, pl. v. fig. 6 (1815).

*Cymo andreossyi*, de Haan, Crust. Japon. p. 22 (1839); Alcock, Journ. As. Soc. Beng. lxvii. 2, p. 173 (1898).

*Loc.* Kelantan.

A female, rather damaged.

*Dim.*  $10 \times 8.5.$

Breadth taken is *greatest* breadth.

### XVII. Genus THALAMITA Latr.

#### 24. THALAMITA CRENATA Latr.

*Thalamita crenata* (Latr.), M.-Edw. Hist. Nat. Crust. i. p. 461 (1834); de Man, Merg. Crust. p. 79 (1888); Lanchester, P. Z. S. 1900, p. 748.

*Loc.* Pulau Bidan, Penang.

Five males and two females.

The following table serves to show the variation in respect to the denticulation of the posterior border of the penultimate joint of the natatory legs:—

	$\delta.$	$\varphi.$
Non-denticulate .....	1	0
Denticulate .. { Right side only....	1	1
Left side only ....	1	1
Both sides ..... .	2	0

The number, position, and size of these denticles is quite inconstant.

*Dim.*  $\delta\ 71 \times 46.$   $\delta\ 68 \times 45.$   $\delta\ 63 \times 40.$   $\delta\ 55.5 \times 36.$   
 $\delta\ 49 \times 32.$   $\varphi\ 57 \times 37.$   $\varphi\ 55 \times 35.5.$

#### 25. THALAMITA DANÆ Stimpson.

*Thalamita crenata*, Dana, U.S. Expl. Exp., Crust. i. p. 282, pl. xvii. fig. 7 (1852).

*Thalamita danæ*, Stimpson, Proc. Ac. Nat. Sci. Philad. p. 37 (1858); de Man, Mergui Crust. p. 78 (1888).

*Thalamita stimpsoni*, A. M.-Edw. Arch. Mus. x. p. 362, pl. xxxv. fig. 4 (1861).

*Loc.* Pulau Bidan, Penang.

A male of the species and a female of the variety *stimpsoni* In the latter the denticulations on the posterior border of the penultimate joint of the natatory legs are more regular and more marked, and the lobes at the upper internal angle of the eye are straighter and more transverse.

*Dim.*  $\delta\ 39 \times 25.$   $\varphi\ 41 \times 25.$

## XVIII. Genus NEPTUNUS de Haan.

## 26. NEPTUNUS PELAGICUS Linn.

*Cancer pelagicus*, Linn. Syst. Nat. (ed. xii.) p. 1042 (1766).

*Portunus (Neptunus) pelagicus*, de Haan, Crust. Japon. p. 37, pls. ix., x. (1839).

Loc. Kota Bharu, Kelantan ; Trengganu.

Five males and four females. Of the latter one bears ova, and in another the presence of a parasite in the left branchial cavity goes with an abdomen approaching the male in form.

Dim. ♂ 121·5 × 65. ♂ 98 × 53. ♂ 83 × 45·5. ♂ 83 × 45.  
 ♂ 57 × 31·5. ♀ 100·5 × 55. ♀ 125 × 68. ♀ 66·5 × 37.  
 ♀ 53 × 28.

## 27. NEPTUNUS (AMPHITRITE) GLADIATOR Fabr.

*Portunus gladiator*, Fabr. Ent. Syst., Suppl. p. 368 (1798).

*Lupea gladiator*, M.-Edw. Hist. Nat. Crust. i. p. 456 (1834).

*Neptunus gladiator*, A. M.-Edw. Arch. Mus. x. p. 330 (1861); de Man, Mergui Crust. p. 70 (1888).

Loc. Trengganu.

A very large male and a small female, in which the swimming-legs only are present.

In the male the median teeth of the front are much smaller than the submedians, and the lowest external carina on the hand is very strongly developed, forming an obtuse ridge proximally; the ridges on the second and third abdominal segments are also very strong; in these three points it resembles *N. argentatus* White. In the female the abdominal ridges are moderately prominent, and the median frontal teeth, though smaller in size than, are equal in length to, the submedians. In both there is a short blunt spine over the eye as in *N. gladiator*, and there are no traces of the silver sheen found in *N. argentatus*. They certainly belong to *N. gladiator* Fabr., and it seems very possible that *N. argentatus* White is no more than a variety of this species.

The male bears on the legs, first two abdominal segments, and the base of the left antenna some pedunculate Cirripedes, all belonging to the genus *Dichelaspis*, and comprising two or possibly three species.

Dim. ♂ 68 × 43. ♀ 23 × 14.

## XIX. Genus GONIOSOMA A. M.-Edw.

## 28. GONIOSOMA NATATOR Herbst.

*Cancer natator*, Herbst, Naturg. d. Krab. p. 156, pl. xl. fig. 1 (1795).

*Goniosoma natator*, A. M.-Edw. Arch. Mus. x. p. 370 (1861); de Man, Arch. f. Naturg. liii. i. p. 334, pl. xiii. fig. 5 (1887).

Loc. Pulau Bidan, Penang.

A male, of which the chelipeds are lost.

This individual belongs, without doubt, to Herbst's species. I

may note, however, that the frontal lobes are comparatively sharp, though still with blunt points, and separated by rather deep wide fissures—a character apparently correlated with age (*vide de Man, t. c. p. 335*).

*Dim.*  $80 \times 53.5$ .

29. GONIOSOMA ORNATUM A. M.-Edw.

*Goniosoma ornatum*, A. M.-Edw. Arch. Mus. x. p. 376 (1861); Henderson, Trans. Linn. Soc. (2) Zool. v. p. 376 (1893).

*Loc.* Kota Bharu, Kelantan.

Two males and two females, each with ova.

In one of the females with ova the second antero-lateral tooth on the left side is very rudimentary, being only one-third the size of the first and third.

*Dim.* ♂  $35 \times 24$ . ♂  $35 \times 24$ . ♀  $32 \times 22$ . ♀  $29.5 \times 20$ .

30. GONIOSOMA AFFINE Dana.

*Charybdis affinis*, Dana, U.S. Expl. Exp., Crust. p. 286, pl. xvii. fig. 12 (1852).

*Goniosoma affine*, A. M.-Edw. Arch. Mus. x. p. 384 (1861); de Man, Merg. Crust. p. 80, pl. v. fig. 2 (1888).

*Loc.* Trengganu.

A male. All the legs absent.

*Dim.*  $21.5 \times 14.5$ .

31. GONIOSOMA CRUCIFERUM Fabr.

*Portunus crucifer*, Fabr. Ent. Syst., Suppl. p. 364 (1793).

*Goniosoma cruciferum*, A. M.-Edw. Arch. Mus. x. p. 371 (1861); de Man, Merg. Crust. p. 79 (1888)

*Loc.* Trengganu.

Three males and a female with ova.

*Dim.* ♂  $110 \times 71$ . ♂  $40.5 \times 27$ . ♂  $36 \times 24.5$ . ♀  $90 \times 60$ .

32. GONIOSOMA CALLIANASSA A. M.-Edw.

*Goniosoma callianassa*, A. M.-Edw. Arch. Mus. x. pp. 382, 385 (part.) (1861); Alcock, Journ. As. Soc. Beng. lxviii. 2, p. 57 (1899).

*Loc.* Kota Bharu, Kelantan.

A female with ova.

The last antero-lateral spine is fully twice as long as that in front of it.

*Dim.*  $22 \times 15$ .

XX. Genus POTAMON Sav.

33. POTAMON (PARATHELPHUSA) SINENSE M.-Edw.

*Parathelphusa sinensis*, M.-Edw. Arch. Mus. vii. p. 173, pl. xiii. fig. 1 (1854); Henderson, Trans. Linn. Soc. (2) Zool. v. p. 386 (1893).

*Loc.* Singora; Tale Sap.

Thirteen males and four females.

The rostrum projects less beyond the level of the external

orbital angles in the younger individuals, and its margin is a little straighter.

One individual, from Kampong Patel, is called, according to the label on it, by the name "Ketam Kertak." "Ketam" is the ordinary word for crab; I am unable to find a meaning for the word "Kertak"<sup>1</sup>.

*Dim.* ♂  $47\cdot5 \times 39$ . ♂  $43 \times 34$ . ♂  $43 \times 35$ . ♂  $33\cdot5 \times 28$ . ♂  $27 \times 23$ . ♂  $20\cdot5 \times 18$ . ♀  $40 \times 34$ . ♀  $40 \times 33\cdot5$ . ♀  $22\cdot5 \times 19\cdot5$ .

34. *POTAMON (PARATHELPHUSA) IMPROVISUM*<sup>2</sup>, sp. n. (Plate XXXIII. fig. 2.)

*Loc.* — ?

One female.

In this species the carapace is very depressed posteriorly behind the postfrontal ridge, but in front of this ridge it slopes down rather steeply towards the frontal and antero-lateral margins. The actual front, however, is directed nearly horizontally, and presents a faintly concave upper surface; its anterior margin is rather sharp and its course sinuous, this latter being due to the presence of a broad and shallow notch in the median line, and to the sloping away of its outer angles into the upper orbital borders. The latter are very slightly swollen, noticeably at their internal angles, hardly at all at their external angles, where these run into the extra-orbital teeth; a shallow notch is discernible under the lens at the middle of the border. The orbits themselves are deep, their width is a little more than half that of the front, which is, in turn, one-third of the width of the carapace at its widest point (viz., between the last epibranchial teeth). The lower orbital border, seen under the lens, is crenulate, and presents at its inner angle a distinct tubercular tooth with two rounded heads, which are placed so that the one lies above the other in the natural position of the animal, and which are separated by a shallow groove, the said groove being continued downwards and backwards nearly to the anterior buccal angles.

The antero-lateral borders are about as long as the front is wide, or two-thirds the length of the postero-lateral, and are armed with four teeth, including the extra-orbital. Of these teeth the 1st is forwardly directed, triangular, blunt, and broad at the base; the 2nd, separated by a very short rounded interval from the 1st, is the smallest of all, forwardly curved, sharp, and conical; the 3rd, separated from the 2nd by a slightly greater rounded interval, is closely similar to the latter, but twice as big; while the 4th, whose tip is as far from that of the preceding tooth as the latter is from the tip of the extra-orbital, is more outwardly directed, its anterior

<sup>1</sup> "Kertak," Mr. Laidlaw informs me, is an orthographical error; the word should have been written "Katak," meaning "a frog."

<sup>2</sup> A similar abbreviated metamorphosis is known for *Potamon fluviale*, *Dilocarcinus*, and *Trichodactylus* (cf. Ortmann, Bronn's Thierreich, v. 2, p. 1098).

border being only slightly curved, and its posterior border practically straight and in line with the postero-lateral border of the carapace ; it is also sharp, and a little smaller than the tooth in front of it. The postero-lateral border is straight, inwardly directed, and scored with irregular oblique rugosities, which extend only the least distance on to the carapace.

The frontal ridge is very prominent and sharp, and composed of two quite distinct portions : an outer, starting from the last epibranchial tooth, and extending inwards and slightly forwards, with a faintly sinuous course, to within 2–3 mm. of the mesogastric suture ; and an inner, lying as far in front of the outer as this does from the mesogastric suture, and starting internally from the fore part, here rather deep, of the mesogastric suture, and extending, faintly crescent-shaped with forwardly directed concavity, to the level of the external angle of the front, its anterior border shelving very sharply down to the front.

The surface of the carapace is everywhere punctate, the punctæ being distinct and fairly disparate ; the cardiac suture is well defined, and the gastric region in front of it is slightly tumid, and a very broad distinct uro-cardial suture is also present. The mesogastric suture starts at the level of the inner frontal ridges, and disappears just behind the level of the outer frontal ridges.

The chelipedes are quite smooth, with a small spine near the distal end of the upper margin of the merus, and a strong spine at the upper inner angle of the carpus ; the fingers are as long as the palm, and slightly gaping, with a row of tubercular teeth on their inner edges, two or three of which are bigger than the rest ; their tips are somewhat hooked and cross each other.

The four posterior legs present no noteworthy features, excepting that the meri of all bear a fairly strong spine at the distal ends of their upper edges, and the carpi carry a ridge along the middle of their hinder surfaces ; in the last pair, however, this ridge is rounded and inconspicuous.

Special interest attaches to this species from the fact that this individual carries beneath the abdomen, attached to the swimmerets, a number (about 100) of young, all of which are fully formed, *i. e.* present the structure of the adult. Such an occurrence has, I believe, never been observed in any other crab, and it points to a quite unusual abbreviation of the metamorphosis, though to what exact extent it is, at present, impossible to say ; while the causes of the abbreviation in this case are equally unknown.

*Dim.* 37 × 21·5.

### 35. POTAMON (POTAMONAUTES) STOLICZKANUM W.-Mason.

*Telphusa stoliczkanæ*, W.-Mason, Journ. As. Soc. Beng. xl. p. 199, pl. xii. fig. 8 (1871).

*Loc.* Lacom.

Five females and a smaller male.

I have only to notice that the "baying" of the front is quite inconsiderable in these specimens, though more apparent in some

than the others ; this, however, appears to be a sexual difference, as Wood-Mason, in giving dimensions of a male and female respectively, adds "the greater difference between the length and breadth in the male specimen is only apparent, being entirely due to the greater mesial excavation of the front." I may add, however, that in this male the front is hardly, if at all, more excavate than in the females.

*Dim.* ♂ 14·75 × 12. ♀ 31·5 × 23·5. ♀ 30·25 × 23. 2♀ ♀ 29·5 × 22·5. ♀ 28·5 × 22·25.

Breadth taken is greatest breadth.

## XXI. Genus OCYPODE Fabr.

### 36. OCYPODE CERATOPHTHALMA Pallas.

*Cancer ceratophthalmus*, Pal. Spicil. Zool. ix. p. 83, pl. v. fig. 17 (1772).

*Ocypoda ceratophthalma*, Miers, Ann. Mag. Nat. Hist. (5) x. p. 379, pl. xvii. fig. 1 (1882).

*Loc.* Trengganu ; Kelantan.

Eight males and four females.

In two males of dimensions 27·5 × 23 the ocular styles are from 3–4 mm. in length ; but in a female of 27 × 20·5 they are barely 1 mm.

*Dim.* ♂ 44 × 37·25. ♂ 43·5 × 39. ♂ 43 × 39. ♂ 42·5 × 38. ♂ 40·5 × 36·5. ♂ 35 × 30. 2♂ ♂ 27·5 × 23. ♀ 40 × 35. ♀ 35 × 30·5. ♀ 27 × 20·5. ♀ 20·5 × 16.

### 37. OCYPODE CORDIMANA Latr.

*Ocypoda cordimana* (Latr.), M.-Edw. Hist. Nat. Crust. ii. p. 45 (1837); de Man, Notes Leyd. Mus. iii. p. 248 (1881); Miers, Ann. Mag. Nat. Hist. (5) x. p. 387, pl. xvii. fig. 9 (1882).

*Loc.* Trengganu ; Kelantan.

Three females.

*Dim.* ♀ 20 × 16. ♀ 18 × 15. ♀ 15 × 12.

### 38. OCYPODE CONVEXA Quoy et Gaimard.

*Ocypoda convexa*, Quoy et Gaim. Voy. 'Uranie,' Zool. p. 525, pl. xvii. fig. 2 (1824); Nobili, Ann. Mus. Civ. Stor. Nat. Genova, (2) xx. p. 518 (1900).

*Loc.* Trengganu.

Four males and four females.

Dr. Nobili has recently (*l. c.*) amplified the original description of this species ; and in order to assure myself of the identity of the present form with that species, I sent examples to Dr. Nobili, who very kindly compared them for me with the specimens he had described from Sarawak, and informs me that they are identical. "The only difference," he adds, "is that the greater hand is a little more swollen, and the finger a little shorter, in the specimen (♂) from Sarawak, which is somewhat smaller."

One of the females varies in that both the hands are of the same

size and shape, resembling the smaller chelipedes of the other individuals, and I will also call attention to the rather noticeable variation in the relative proportions of length and breadth.

*Dim.* ♂ 26 × 21. ♂ 26·25 × 22. ♂ 27·5 × 21. ♂ 15 × 11.  
♀ 27 × 21. ♀ 28·5 × 21·25. ♀ 25·5 × 20. ♀ 24 × 19.

## XXII. Genus UCA Leach.

### 39. UCA ANNULIPES M.-Edw.

*Gelasimus annulipes*, M.-Edw. Hist. Nat. Crust. ii. p. 55, pl. xviii. figs. 10–13 (1837); de Man, Merg. Crust. p. 118, pl. viii. figs. 6–7 (1888).

*Loc.* Singora; Trengganu.

Thirty-two males and three females.

Of the males sixteen have the large chela on the right side, and the other sixteen on the left.

*Dim.* ♂ 19 × 11·5. ♂ 17·5 × 11. ♂ 17 × 10. ♂ 16·5 × 10.  
♂ 16·5 × 9. ♀ 12·25 × 8. ♀ 11·5 × 7. ♀ 11·5 × 8.

### 40. UCA TETRAGONON ? Herbst.

*Cancer tetragonon*, Herbst, Naturg. d. Krab. i. p. 257, pl. xx. fig. 110 (1790).

*Gelasimus tetragonon*, M.-Edw. Ann. Sci. Nat. (3) xviii. p. 147, pl. iii. fig. 9 (1852); Kingsley, Proc. Ac. Nat. Sci. Philad. p. 143, pl. ix. fig. 11 (1880).

*Loc.* Trengganu.

A single female, which I refer rather doubtfully to this species.  
*Dim.* 17·5 × 12.

## XXIII. Genus VARUNA M.-Edw.

### 41. VARUNA LITTERATA Fabr.

*Cancer litteratus*, Fabr. Ent. Syst., Suppl. p. 342 (1798).

*Varuna litterata*, M.-Edw. Hist. Nat. Crust. ii. p. 95 (1837); Hasw. Cat. Austr. Crust. p. 103 (1882).

*Loc.* Kota Bharu, Kelantan.

Two males and a female.

*Dim.* ♂ 20·5 × 19·5. ♂ 21·5 × 21. ♀ 26·5 × 25·5.

## XXIV. Genus GRAPSUS Lam.

### 42. GRAPSUS STRIGOSUS Herbst.

*Cancer strigosus*, Herbst, Naturg. d. Krab. iii. p. 55, pl. xlvi. fig. 7 (1799).

*Grapsus strigosus*, A. M.-Edw. Nouv. Arch. Mus. ix. p. 286 (1873); Hasw. Cat. Austr. Crust. p. 97 (1882).

*Loc.* Pulau Bidan, Penang.

Five males and a female.

*Dim.* ♂ 49 × 43·5. ♂ 41 × 37. ♂ 30·5 × 28. ♂ 24 × 21·5.  
♀ 45 × 40.

## XXV. Genus METOPOGRAPSUS M.-Edw.

## 43. METOPOGRAPSUS MACULATUS M.-Edw.

*Metopograpsus maculatus*, M.-Edw. Ann. Sci. Nat. (3) xx. p. 165 (1853); de Man, Mergui Crust. p. 145, pl. x. figs. 1-3 (1888).

*Loc.* Singora.

A single male, which accords in all points with Dr. de Man's description.

*Dim.*  $27 \times 22$ .

Width of front 18 mm.

## XXVI. Genus SESARMA Say.

## 44. SESARMA (SESARMA) LAFONDII Jacq. et Lucas.

*Sesarma lafontii*, Jacq. et Luc. Voy. Pôle Sud, Crust. p. 70, pl. vi. fig. 4 (Hombron et Jacq. t. iii.) (1853); de Man, Zool. Jahrb. Syst. ii. p. 639 (1887).

*Loc.* Singora.

A female.

*Dim.*  $28 \times 25$ .

## 45. SESARMA (PARASESARMA) QUADRATA Fabr.

*Cancer quadratus*, Fabr. Ent. Syst., Suppl. p. 341 (1798).

*Sesarma aspera*, de Man, Mergui Crust. p. 169 (1888).

*Sesarma quadrata*, id. Weber's Zool. Erg. v. 2, p. 328 (1892); id. Zool. Jahrb. Syst. ix. p. 182 (1897).

*Loc.* Trengganu.

One male and two females.

The pectinated ridges are less developed in the females, and without black tips to the teeth. In the larger female, of which only the right chelipede is present, the tubercles on the finger are rather worn, and seem, in consequence, a little more confluent than usual; they are 11-12 in number, the first two at the base of the finger being very small. The carapace, moreover, in this individual has a generally smoother aspect than in the other two, due to the relative scantiness of the small hairs, notably on the fore part of the carapace.

(N.B.—In regard to the wearing of the tubercles in the female, compare de Man, Zool. Jahrb. ix. p. 183.)

*Dim.* ♂  $16 \times 12$ . ♀  $16 \times 13$ . ♀  $15 \times 11$ .

## 46. SESARMA (GEOSESARMA) MACULATA de Man.

*Sesarma maculata*, de Man, Weber's Zool. Erg. v. 2, p. 347, pl. xxi. fig. 19 (1892).

*Loc.* Lacom.

Four males and two females, one of the latter with ova. I have little to add to Dr. de Man's very complete description. One of the larger males only shows ten sharp tubercles on the upper

margin of the movable finger of the right side (that on the left being absent); the other has only *seven* on each side. In the two smaller males these tubercles are very indistinct, and I can only discern *six* or, perhaps, *seven*. In cases where these teeth number less than ten, they occur on the proximal half, and cease at the middle, of the finger.

Dr. de Man has noted the presence of fewer tubercles in the female, and the two females here present accord with this feature. Further I note that the dark spots described as occurring on the chelipedes are present also on the abdomen and uncovered surface of the sternum; in the female they even extend, on the sternum, a little way under cover of the abdomen.

As regards the ova, I am able to confirm Dr. de Man's reference of the species to his subgenus *Geosesarma*; the eggs are few in number (30-40) and rather large, being a trifle more than 1 mm. in diameter. They tend to a coloration such that one hemisphere is white, the other brown.

*Dim.* ♂  $11\cdot5 \times 11\cdot75$ . ♂  $10 \times 10$ . ♂  $7\cdot5 \times 7\cdot5$ . ♂  $6 \times 6$ .  
♀ with ova  $11 \times 11\cdot25$ . ♀  $9\cdot75 \times 9\cdot75$ .

## XXVII. Genus PINNOTHERES.

### 47. PINNOTHERES SOCIUS. (Plate XXXIII. fig. 3.)

Cf. *Pinnotheres cardii*, Bürger, Zool. Jahrb. Syst. viii. p. 367, pl. ix. fig. 4, pl. x. fig. 4 (1895).

*Loc.* Pulau Bidan, Penang.

One female with ova.

I find the following note in the bottle with this specimen: "This little crab was found inside the infra-branchial chamber of a bivalve, the mantle of which fuses in the mid-ventral line."

Cephalothorax, chelipedes, and legs in all respects as in *P. cardii*, except that the posterior border of the cephalothorax is faintly hollowed. But the external maxillipedes differ in (*a*) their much narrower meral joint and (*b*) the hollowing of the distal extremity of the propodus (*vide* fig. 3).

## XXVIII. Genus MATUTA Fabr.

### 48. MATUTA VICTRIX Fabr.

*Matuta victor*, Fabr. Ent. Syst., Suppl. p. 369 (1798).

*Matuta victrix*, Miers, Trans. Linn. Soc. (2) Zool. i. p. 243, pl. xxxix. figs. 1-3 (1877).

*Matuta victor*, Alcock, Journ. As. Soc. Beng. lxv. 2, p. 160 (1896).

*Loc.* Pulau Bidan, Penang.

Fourteen males and eleven females.

Of the males, one (*dim. =*  $29\cdot5 \times 27$ ) shows the female characteristic pointed out by Major Alcock (*t. c.*), viz. a more

prominent ridging in the case of the second than of the third segment of the abdomen. One female carries a stalked cirripede, of the genus *Dichelaspis*, on the carapace just behind the front.

*Dim.* ♂  $49 \times 45$ . ♂  $43.5 \times 40$ . ♂  $39 \times 36$ . ♂  $39 \times 36$ .  
 ♂  $35 \times 32.5$ . ♂  $29.5 \times 27$ . ♀  $35 \times 32.25$ . ♀  $35 \times 32.5$ . ♀  $33.5 \times 31.5$ . ♀  $30 \times 28$ . ♀  $29 \times 27.75$ . ♀  $22 \times 21$ .

#### 49. MATUTA BANKSII Leach.

*Matuta banksii*, Leach, Zool. Misc. iii. p. 14 (1817); Miers, Trans. Linn. Soc. (2) Zool. i. p. 245, pl. xl. figs. 1-2 (1877); Lan- chester, P. Z. S. 1900, p. 762.

*Matuta picta*, Hess. Arch. f. Naturg. xxxi. p. 158 (1865).

*Loc.* Pulau Bidan, Penang.

Seven males and nine females.

I have already (*t. c. supra*) noted the absence, in some females of this species from Malacca, of the crimson patches on the 1st, 2nd, and 4th pairs of ambulatory legs. Here, too, they are absent in the females; but yellow patches, more or less distinct, may be seen in the same positions; so that it seems possible that the crimson coloration fades in spirit more readily, for some reason, in the females than in the males. One of the females shows the reticulate markings, characteristic of *M. picta* Hess., very clearly; there is a slight tendency in another female and a male to reticulation anteriorly. The strongly reticulated female has the six tubercles on the carapace more rounded and obscure; the others, too, show variation in a similar direction of this character.

The front I should still describe (*vide t. c.*) as distinctly emarginate.

Major Alcock has identified *M. picta*, in his synonymy of *M. banksii*, with the latter species (J. A. S. B. lxv. 2, p. 158). Dr. de Man (Notes Leyd. Mus. iii. 1881, p. 116) has noted the close similarity of the two species, apart from their coloration, and has further mentioned the still closer similarity of female *M. picta* with female *M. banksii*; and Dr. Nobili considers *M. picta* as a variety of *M. banksii* (Ann. Mus. Civ. Stor. Nat. Genova, xx. p. 251, 1899).

From what these authors have remarked with respect to the markings of the carapace, it is evident that they are variable—simple spots, groups of two or three spots, spots arranged in curved lines, and so to definite reticulations. And the crimson patches on the legs, which seem to be characteristic of *M. banksii*, are also variable, the variation, however, being apparently confined to the females, and perhaps not extending further than a relatively readier solubility of the pigment under certain conditions—that, at least, is as far as the evidence goes. I do not know how far the sharpness or obtuseness of the fourth spine on the outer ridge of the hand is a definite character (*vide de Man, t. c. p. 116 and p. 120*); but the relative length of this spine to the second, and consequently its own relative obtuseness, is distinctly different in the different individuals of this series.

For these reasons, then, I have included *M. picta* under *M. banksii*, following Major Alcock and Dr. Nobili.

I should add that there is a marked tendency of the epibranchial spines in these specimens to be bent slightly backwards in their outer third.

*Dim.* ♂  $37 \times 36$ . ♂  $35 \times 34$ . ♂  $35 \times 33\cdot75$ . ♂  $34 \times 33\cdot5$ .  
 ♂  $31 \times 29\cdot75$ . ♂  $30\cdot5 \times 29\cdot75$ . ♀  $31 \times 30$ . ♀  $31 \times 29\cdot5$ .  
 ♀  $29 \times 28$ . ♀  $28 \times 27$ . ♀  $26\cdot75 \times 25\cdot5$ . ♀  $19 \times 18\cdot5$ .

### XXIX. Genus DORIPPE Latr.

#### 50. DORIPPE DORSIPES Linn.

*Cancer dorsipes*, Linn. Syst. Nat. (ed. xii.) i. 2, p. 1053 (1766).

*Dorippe quadridens*, de Haan, Crust. Japon. p. 121, pl. xxxi. fig. 3 (1839).

*Dorippe dorsipes*, Alcock, Journ. As. Soc. Beng. lxv. 2, p. 277 (1896).

*Loc.* Pulau Bidan, Penang.

Two males and a female.

*Dim.* ♂  $24 \times 21\cdot5$ . ♂  $24\cdot5 \times 22\cdot75$ . ♀  $16 \times 15$ .

#### 51. DORIPPE FACCHINO Herbst.

*Cancer facchino*, Herbst, Naturg. d. Krab. i. 6, p. 190, pl. xi. fig. 68 (1785).

*Dorippe sima*, M.-Edw. Hist. Nat. Crust. ii. p. 157, pl. xx. fig. 11 (1837).

*Dorippe facchino*, Alcock, Journ. As. Soc. Beng. lxv. 2, p. 278 (1896); Lanch. P. Z. S. 1900, p. 768.

*Loc.* Patani.

A small male.

This individual bears a small anemone on its back with a bivalve shell and ? Gastropod operculum interposed (*cf.* Lanch. t. c. p. 769).

*Dim.*  $11 \times 8\cdot5$ .

### XXX. Genus SQUILLA Fabr.

#### 52. SQUILLA RAPHIDEA Fabr.

*Squilla raphidea*, Fabr. Ent. Syst., Suppl. p. 416 (1798).

*Squilla harpax*, de Haan, Crust. Japon. p. 222, pl. li. fig. 1 (1839).

Singora; Kota Bharu.

Two males; length 10 in. and 6 in.

#### 53. SQUILLA NEPA Latr.

*Squilla nepa*, Latr. Encycl. Méth. x. p. 471 (1825); Miers, Ann. Mag. Nat. Hist. (5) v. p. 25 (1880).

Fatani; Trengganu; Kota Bharu.

Numerous examples, from 3-4 in. in length.

54. *SQUILLA SCORPIO* Latr.

*Squilla scorpio*, Latr. Encycl. Méth. x. p. 471 (1825).

Patani ? or Trengganu ?

A male and a female; length about 3 in.

XXXI. Genus *LYSIOSQUILLA* Dana.55. *LYSIOSQUILLA SPINOSA* W.-Mason.

*Lysiosquilla spinosa*, W.-Mason, Journ. As. Soc. Bengal, p. 222 (1875); Miers, Ann. Mag. Nat. Hist. (5) v. p. 12, pl. i. figs. 10-12 (1880).

*Squilla indefensa*, Kirk, Ann. Mag. Nat. Hist. (5) ii. p. 466 (1878).

Pulau Bidan, Penang.

Five young specimens; length about  $\frac{3}{4}$  in.

These small individuals seem to belong to this species; the form of the telson is quite in accordance with Mr. Miers's description. There are from twelve to fourteen spines on the dactyls of the raptorial claws; and a minute spine on the posterior part of the base of each of the last three thoracic legs.

Exposed thoracic and abdominal segments suffused with rosy-red, aggregated on the posterior segment into minute red spots; raptorial limbs with black spots; body with black spots, lying superficially to the red coloration and tending to mass at the postero-lateral angles of the abdomen; they form, in particular, two conspicuous black marks on the telson just over the submedian marginal spines. The gut appears through the body-wall, in three individuals, as a median black line.

XXXII. Genus *CHLORIDELLA* Miers.56. *CHLORIDELLA CHLORIDA* Brooks.

*Squilla chlorida*, Brooks, 'Challenger' Stomatopoda, p. 40, pl. ii. figs. 1-5 (1886).

Kelantan.

A male; length about 3 in.

I note the presence in this specimen of submedian carinæ on *all* the abdominal segments, fainter on the front segments than on those behind, those of the sixth ending in a small sharp spine; the inner margin of the inner spine of the ventral prolongation of the uropods carries seven, instead of four or five, spines; the tubercles on the telson are clearly arranged in three curved rows on each side of the dorsal median carina; the carapace bears a very faint median carina. I will also add that the penultimate joint of the exopodite of the uropods bears on its outer margin seven strongly curved spines, of which the most distal is about twice as long as the others.

## XXXIII. Genus GONODACTYLUS Latr.

## 57. GONODACTYLUS CHIRAGRA Fabr.

*Squilla chiragra*, Fabr. Ent. Syst. p. 513 (1793).

*Gonodactylus chiragra*, Latr. Encycl. Méth. x. p. 473 (1825); Miers, Ann. Mag. Nat. Hist. (5) v. p. 118 (1880); Borradale, P. Z. S. 1898, p. 34.

*Loc.* Pulau Bidan, Penang; Kota Bharu, Kelantan.

A male and two females from Palau Bidan; four males and seven females from Kelantan. A single male of the var. *smithii* Pocock from Kelantan.

Although the general colour of the latter has been much darkened by the formol in which these specimens were preserved, it is still quite possible to discern the five dark spots on the sides of the abdomen that Borradale has noted in his examples of var. *smithii*.

Length: ♂  $2\frac{1}{4}$  in., ♀  $4\frac{1}{2}$  in., ♀  $2\frac{3}{4}$  in., the smaller examples ranging from  $\frac{1}{2}$  to 1 in.

## 58. GONODACTYLUS CULTRIFER White.

*Gonodactylus cultrifer*, White, P. Z. S. 1850, p. 96 (Annulosa), pl. xvi. fig. 1; Miers, Ann. Mag. Nat. Hist. (5) v. p. 117 (1880).

*Loc.* Kota Bharu, Kelantan.

A male without the raptorial limbs. Length  $4\frac{1}{4}$  in.

I may note that the rostrum does not nearly reach the base of the eye-peduncles as it appears to do in White's figure. Further, the number of spines on the outer edge of the penultimate joint of the exopodite of the uropods is eight; White's figure represents eight only, but both he and Mr. Miers give the number as nine in the text.

The submedian spines of the telson consist of a short, fixed, basal portion bearing a slightly longer movable spine.

## XXXIV. Genus GEBIOPSIS A. M.-Edw.

## 59. GEBIOPSIS INTERMEDIA de Man.

*Gebiopsis intermedia*, de Man, Mergui Crust. p. 256 (1888).

*Loc.* Pulau Bidan, Penang.

Numerous examples; ranging from 42 mm. in length downwards. The long hairs on the lower margins of the meropodites of the first two pairs of legs would appear to act as a sifting (? sensory and selecting) apparatus for food; for if these legs be thrust somewhat forwards and at the same time flexed upwards at the mero-carpal joint, these hairs will be found to form a complete guard to the buccal cavity.

## XXXV. Genus CALLIANASSA.

## 60. CALLIANASSA SECURA, sp. n. (Plate XXXIV. fig. 2.)

*Loc.* Kota Bharu, Kelantan.

A female.

This species is closely related to *C. pachydactyla* A. M.-Edw. (cf. Nouv. Arch. Mus. t. vi. p. 86, pl. ii. fig. 1), while presenting at the same time several differences which clearly mark it off as a distinct species. It resembles that species chiefly by the extreme shortness of the carpal joint in the 1st pair, and the general smoothness of surface in that pair, and, as well, in the fairly strong development of the telson; but differs notably in the fact that the external maxillipedes are even more pediform, and that the merus of the 1st pair is *quite unarmed*, no trace of denticulation being found anywhere on the leg.

The rostrum and eyes are as in *C. pachydactyla*, though the point of the rostrum appears blunter in our species.

The eyes reach beyond the middle of the 1st antennular joint; the 3rd joint of the antennular peduncles is barely twice as long as the 2nd, and their flagella 2-3 times as long as the 3rd joint and about two-thirds the length of the carapace.

In the antennal peduncles, the 3rd joint is twice as long as the 2nd, and the latter twice as long as the 1st; the flagellum is a little longer than the carapace. The 3rd maxillipedes are pediform, the carpal joint alone being slightly dilated; the ischium is regularly and evenly denticulated on its inner edge; the denticulations being very small and best seen with a lens.

The larger chelipede is entirely smooth, except for a well-marked line of hairs on the inner upper edge of the hand and daetyl, a few more scattered hairs on their under edge and outer surface, the coarse denticulation of the fingers, on each of which one tooth is more prominent than the rest, and a very short, bluntly 3-toothed, forwardly directed ridge on the under distal angle of the carpus. The ischium and merus are the same length (4 mm.); the ischium long and narrow, the merus broad and swollen, with a very blunt, but still distinct, ridge on its outer surface. The carpus is much shorter than the palm (carpus 1·75-2 mm., palm 5 mm.), but of nearly the same depth vertically, = 3 mm.; the fingers are a little shorter than the palm, = 4 mm. In the smaller chelipede, which is longer and slender, the carpus is 3 mm. long, the palm 4 mm., and the fingers 2 mm.; this appendage also is quite smooth. The 2nd pair are as in *C. pachydactyla*; in the 3rd pair, however, the posterior edge of the propodite is not scooped out as in that species, rather the joint is barrel-shaped (see fig. 2).

Of the abdominal segments, the 1st is the shortest, the 2nd and 3rd the longest, equal or nearly so, the 4th, 5th, and 6th a little shorter than those preceding; the telson is the same length as the 1st abdominal segment, rounded and smooth above, and somewhat shorter than the uropods, the inner joints of which bear a longitudinal ridge down the middle of their upper surfaces.

From *C. amboinensis* de Man (cf. Arch. f. Naturg. liii. i. p. 480, pl. xx. fig. 4), which is, again, a closely allied species, *C. secura* differs: (a) in its much shorter carpus; (b) in the much shorter 3rd joint of the antennular peduncle; (c) in the ridged surface of the

inner uropodal joint. It resembles it in the general smoothness of the chelipedes, the length of the telson, and apparently the shape of the propodeite of the 3rd pair of legs (*t. c. p.* 482, "Das vorletzte Glied des dritten Fusspaarer ist oval.")

Length of animal 31·5 mm.; length of carapace 7·25 mm.

### XXXVI. Genus ARCTUS Dana.

#### 61. ARCTUS TUBERCULATUS Sp. Bate.

*Arctus tuberculatus*, Sp. Bate, 'Challenger' Macrura, p. 70, pl. x. figs. 1-2 (1888).

*Loc.* Kelantan.

A male and a female, quite agreeing in general with the original description and figure; but the following points may be noted:—The tubercle on the 3rd abdominal segment is not quite so clearly separated from its base as it is in Spence Bate's figure; the coxal plates of abdominal segments 3-5 bear a low ridge, lying transversely to the long axis of the body—this is found down the middle of the plate in segment 5, but in the anterior half in segments 3-4, and divides an anterior smooth from a posterior, short-hairy, surface. The smooth anterior surface plays under the posterior surface of the preceding segment, and the ridge determines the limit within which this play is possible in complete flexion of the tail. In the 2nd abdominal segment this ridge is represented by a short line of low tubercles, and the whole surface is hairy.

### XXXVII. Genus THENUS Leach.

#### 62. THENUS ORIENTALIS Fabr.

*Scyllarus orientalis*, Fabr. Eut. Syst., Suppl. p. 399 (1798); Milne-Edwards, Hist. Nat. Crust. ii. p. 286 (1837).

*Loc.* Kelantan; Trengganu.

Two males and a female; all three are infested with a stalked Cirripede on the mouth-parts, notably on the exopodites of the 2nd maxillipedes. This Cirripede belongs to the genus *Dichelaspis*, and will be described, as a new species of that genus, in the second part of this paper.

Length: ♂ 134 mm., ♂ 120 mm., ♀ 104 mm.

### XXXVIII. Genus SENEX Pfeffer.

#### 63. SENEX ORNATUS Fabr., var. nov. LEVIS.

Cf. *Senex ornatus*, Ortmann, Zool. Jahrb. vi. p. 34 (1892).

*Loc.* Singora.

One full-grown male, just over 1 foot in length.

Although undoubtedly referable to this species, this specimen presents such well-marked differences that I have thought it worth while detailing them and attaching a varietal name thereto. The amount of variation in the species of this genus is evidently very

considerable, and it is therefore difficult to satisfactorily determine the value of differences such as occur, as in the present instance, in a single individual. But where the points of difference are as distinctive as they are here, it does seem to me justifiable to put forward a provisional name, rather as an expression of the occurrence of such variations, than as a definite opinion on the constancy of these variations. For, after having served the purpose of calling the attention of future systematists to the variation noted, the name may readily be dropped or retained according to the results arrived at by the study of more ample material.

Most noticeable, then, in this specimen is the smoothness of the carapace, a smoothness due to the general absence of teeth thereon; such teeth as are present are placed as follows:—Two large supra-orbitals, each with a smaller tooth, about one-quarter the size, close behind at the base; behind these again are six teeth, quite rudimentary, forming the angular points of three contiguous transverse squares on the slightly swollen gastric region. Four transverse teeth, just behind the broad and deep cervical suture, in pairs, *i.e.* two close together on each side. Two strong teeth, one-third size of supraorbitals, on the anterior margin of the carapace on each side, above and below the attachment of the first antennæ; behind the lower of these there is a small tooth on the carapace, and behind and above the upper of these, and a little further back on the carapace, another small tooth. Posterior to these is an oblique furrow formed by a lateral extension of the cervical suture, which is continued downwards and then forwards to a point just below the antero-lateral angle of the carapace, and is here very deep. On the oblique posterior border of this furrow may be seen two small teeth some distance apart.

The abdominal segments are quite smooth, except for some strong punctæ, the first segment only bears a furrow, broad and shallow, with faint traces of hairs. The telson is marked, as customary in the group, with thick longitudinal ridgings, like the rays of a fish's fin, in its distal two-thirds; anterior to this are many small horny spinules arranged in the arc of a circle, the circumferential portion of which is delimited by a white line. The uropods are armed with horny spinules on the posterior margin of their proximal joints; and small closely-set horny spinules are ranged also along the posterior margin of the sixth abdominal segment.

As regards the colour (in formol) it may be noted that the general basis is white, on the carapace, with regular brown patches, which are again marbled with white. Down the middle and on each side the white basis forms three distinct white stripes; these are parallel and do not form a **W** as in *S. demani* Borrad. (*vide* Willey's Zool. Res. iv. p. 418, and *S. polyphagus* Ortmann, Semón's 'Forschungsreise,' v. p. 19). The general basis of the abdomen is a somewhat deeper white; the furrow of the first segment is brown marbled with white; the hind borders of segments 1–4 have a broad brown band with two narrow white bands which are nearly

rectilinear; on segments 5-6 there is only one white band, which in the latter is convex to the hind margin in the middle line. The legs are longitudinally striped with white.

This individual presents all the characteristics of *S. ornatus* as defined by Dr. Ortmann (*l. c.*); the points of difference may be grouped under three headings:—

*a.* The small number of spines on the carapace.

*b.* The coloration, *i. e.*, the three distinct white bands, running longitudinally on the carapace and parallel to each other. Here, too, I may note that the coloration of the abdomen and legs is that of *S. fasciatus* de Haan, but the number of teeth on the antennal segment is that of *S. ornatus*, viz. four.

*c.* A point I have not mentioned above, *viz.*, that the inner antennæ exceed the outer *considerably* in length, namely, by the last joint and one-third of the penultimate joint. In regard to this, Dr. Ortmann says: "Stiele der inneren Antennen etwas länger oder so lang wie die der äusseren."

### XXXIX. Genus ATYA.

#### 64. ATYA ARMATA A. M.-Edw.

*Atya armata*, A. M.-Edw. Ann. Soc. Entom. France, (4) iv. p. 149 (1864); Lanchester, Ann. Mag. Nat. Hist. (7) vi. p. 262 (1900).

*Atya moluccensis*, de Man, Weber's Zool. Ergebn. p. 357, pl. xxi. fig. 20 (1892).

Loc. Selama River, Perak. An adult male.

Belingbing. Three males and three females, all young.

The young forms agree entirely with the description given by Dr. de Man (*t. c.* p. 358); but the adult presents points of difference, in regard to the spines on the last three legs, from the individual examined by Dr. de Man. In the 3rd pair, the merus of the right (larger) leg only bears a blunt tubercle near the carpal joint, and the carpus bears on its under surface a much smaller tubercle, which, in flexion, nearly meets that on the merus. In the 4th pair, the merus of the right leg bears only one spine instead of two, and the carpus one. The left leg has one on the merus, none on the carpus. The 5th pair are as described by Dr. de Man.

The teeth on the under surface of the rostrum number as follows:—

Adult ♂ 9.

Young ♂ 10, 13, 11; ♀ 9, 13, 10.

The length of the adult is 81 mm.; the young specimens range between 57 mm. to 47 mm.

### XL. Genus CARIDINA.

#### 65. CARIDINA MULTIDENTATA Stimpson.

*Caridina multidentata*, Stm. Proc. Ac. Nat. Sci. Philad. p. 29

(1860); de Man, Weber's Zool. Ergebni. p. 380, pl. xxii. fig. 26 (1892).

*Loc.* — ?

A single female with ova; length 16 mm.

Of the teeth on the upper edge of the rostrum in this specimen, only the proximal eight and distal three are clearly separate, the intermediate teeth being represented by a rather ill-defined serrated ridge; on the under edge are nine distinct teeth. The whole rostrum is slightly curved downwards, and the tip is abrupt and blunt. The eggs moderately large, about 1 mm. in length and oval.

#### 66. CARIDINA WYCKII Hickson.

*Caridina wyckii*, Hickson, Ann. Mag. Nat. Hist. p. 357, pls. xiii.—xiv. (1888); de Man, Weber's Zool. Ergebni. p. 386, pl. xxiv. fig. 29 (1892).

*Loc.* River Petwi, Tale Sap.

Two specimens, very damaged, one without antennæ, eyes, and only one or two pereiopods, the other without pereiopods.

These two individuals seem to belong pretty certainly to this species, though their mutilated condition causes some difficulty in deciding their identity.

The rostrum reaches nearly to the end of the antennary plates; its proximal portion is straight, its distal portion deflexed, rising again at the tip; above are 15 small forwardly inclined teeth, of which two or three are on the carapace, while the 15th stops short of the tip by a considerable interval which is unarmed; the tip itself is markedly bifid, and the under edge bears 6 teeth. Antennary peduncle barely reaching the middle of scaphocerite; the antennary tooth double, the lower portion being more prominent and spiniform. The carpus of the 2nd leg is much longer than broad and a little longer than the hand; the other legs are unfortunately broken at the carpus. The telson appears to have only four spines on its hinder edge, of which the two outer are much smaller than the two inner.

#### 67. CARIDINA GRACILLIMA sp. n. (Plate XXXIV. fig. 1.)

Cf. *Caridina gracilirostris*, de Man, Weber's Zool. Ergebni. p. 399, pl. xxv. fig. 31 (1892).

*Loc.* Inland sea near Singora. 250–300 individuals, mostly females with ova.

In regard to the locality it is necessary to add that the label in this instance was almost undecipherable, sufficient indications alone remaining to show that the specimens came from either Tale Sap or Tale Nawi. Tale Sap is an inland sea just above the town of Singora, Tale Nawi a lake at the head of Tale Sap, and connected with the latter by a small strait. As regards the salinity of the water, Mr. Laidlaw informed me that Tale Nawi is quite sweet,

but that Tale Sap, though quite or nearly sweet at its head, increases gradually in salinity towards the mouth, where it is quite salt. In view of the differences between this species and *Car. gracilirostris* it is peculiarly unfortunate that the exact record of the locality should have become, by mischance, obliterated.

The only distinction between this species and *Car. gracilirostris* is found in the rostrum (and, in a small degree, in the telson and 1st two pairs of legs). The structure and relations of antennules, antennæ, maxillipedes, and legs are the same as in *C. gracilirostris*, save only that the 1st pair reach, not to the end of the penultimate joint of the antennæ, but barely to the middle of that joint, and similarly the 2nd pair reach barely beyond the end of the penultimate joint instead of nearly to the end of the last joint. The telson again, though exactly similar in all other points, presents only four pairs of teeth on the upper surface, not five or six.

The rostrum, however, is markedly different. Dr. Nobili has recently described (Ann. Mus. Civ. Stor. Nat. Genov. xx. p. 477, 1900) a new species, *C. modiglianii*, and the rostrum in our species appears intermediate between those of this latter species and *C. gracilirostris*. The number of the teeth on the upper margin is nearly the same as in *C. gracilirostris*, viz. 6–9; these teeth are, however, not nearly so widely separate distally, though the most distal tooth is sometimes placed at a considerable distance from the rest. At the same time the interspaces do increase distally, probably more than in *C. modiglianii* ("sono fitti e avvicinati nella mia nuova specie"). The number of the teeth on the lower edge approaches that of Dr. Nobili's species, ranging from 12–23 as extremes, 16–18, however, being the most common number; in Dr. Nobili's single specimen they numbered 17. As in his species, too, the proximal teeth are better defined than the distal. The rostrum also agrees with those in both these species in being slender and upwardly curved towards the tip; the amount of this curve, however, varies from nearly straight to a strong upward bend. The tip bears mostly a small tooth that gives it a bifid appearance; in a few cases, however, there are two such teeth, making it trifid.

But it is in the *length* of the rostrum that this variety shows its distinctness, as the following table will show:—

	Rostrum. mm.	Carapace. mm.
<i>C. gracilirostris</i> .....	8	4
<i>C. modiglianii</i> .....	7	4
<i>C. gracillima</i> .....	3–6	4

That is, although in a few cases it exceeds the carapace by half its length only (instead of being double, or nearly so, the length of the carapace), it generally exceeds it by only one-quarter, or equals it; while in a few cases yet it even falls short of it. I give measurements (p. 562), taken from twenty-one individuals picked out at random, together with the number of rostral teeth.

These resemblances and differences are, within the limits of

*Table of measurements in millimetres.*

Rostral formula.	Length with rostrum.	Length of rostrum.	Length of carapace.
$\frac{9+1}{19}$	24	5	4
$\frac{8+1}{15}$	22	4	4
$\frac{7+1}{20}$	21	5	4
$\frac{8+1}{18}$	19.5	5	3.5
$\frac{8+1}{17}$	25	6	4
$\frac{6+1}{19}$	21.5	4	3.5
$\frac{7+1}{17}$	23.5	4	3.5
$\frac{6+1}{14}$	20	4	3.5
$\frac{8+1}{17}$	20	4.25	3.25
$\frac{9+1}{17}$	19.5	4	3.5
$\frac{6+1}{18}$	22.25	4.25	3.75
$\frac{8+1}{13}$	20.5	4	3.5
$\frac{7+1}{16}$	20.5	4.5	3.5
$\frac{7+1}{12}$	18.5	4	3
$\frac{7+1}{23}$	21.5	5	3.5
$\frac{8+1}{14}$	16	2.5	2.5
$\frac{7+1}{20}$	..	4.5	4
$\frac{7+1}{18}$	..	5.25	4.5
$\frac{5+1}{14}$	..	4	4
$\frac{5+1}{14}$	..	3	4
$\frac{7+1}{12}$	..	3	3

*Proportions of joints in first two pairs.*

1st leg.	2nd leg
Ischium 2.	Ischium 3.
Merus 4.25-4.5.	Merus 4.
Carpus 3.	Carpus 5.
Hand 2.25.	Hand 2.
Fingers 2.65.	Fingers 2.5.

variation I have indicated, quite constant in the numerous specimens under review. The typical specimens of Dr. de Man's species were obtained from a tidal river at Balangnipa in Celebes; other typical specimens were also obtained from brackish water in Sumatra, and from fresh water at Maros in Celebes, and Pampanua in Celebes. Fifteen *young* individuals from the river Lapa-lupa in Celebes agree with the present form in the number of teeth =  $\frac{(5-7)+(1-2)}{18-25}$ , but "Sie Stimmen, was Form und Länge des Rostrums betrifft, mit den von Balangnipa überein," *i.e.* typical; so, too, with a *young* specimen from Mbawa in Flores, with formula  $\frac{6+1}{21}$ . The number here seems to vary with age; the relative length of the rostrum seems to be characteristic. In view of this latter fact, and in view of the fact that Dr. de Man had specimens from both brackish and fresh water which agree in this particular character, in view, moreover, of the fact that the nature of the water in the present case is uncertain, it seems necessary to dismiss the possibility that this form is a variety of *C. gracilirostris*, characterized by a rostrum shortened through relation to a somewhat different environment, and to regard it as a distinct species, closely allied to *C. gracilirostris*, but differing in (*a*) a shorter rostrum, with a consequent diminishing of the lower row of teeth; (*b*) a fewer number of teeth on the dorsum of the telson; and (*c*) having the legs of the 1st and 2nd pair relatively slightly shorter.

#### XLI. Genus HIPPOLYSMATA Stimpson.

##### 68. HIPPOLYSMATA VITTATA Stimpson.

*Hippolysmata vittata*, Stm. Proc. Ac. Nat. Sci. Philad. p. 26 (1860); de Man, Arch. f. Naturg. liii. i. p. 494 (1887).

*Loc.* Pulau Bidan, Penang.

Five males and six females, length from 25 mm. to 10 mm. The rostral teeth are evidently very variable in this species. I give the formula in each case; in all but one the first tooth on the carapace is separated from the second by a distance double that between the other teeth, but in that one (a female with ova) all the teeth are equidistant.

Rostral formulæ:—  $\frac{8}{4}, \frac{8}{4}, \frac{8}{3}, \frac{8}{3}, \frac{7}{3}, \frac{7}{3}, \frac{7}{2}, \frac{7}{2}, \frac{7}{1}, \frac{6}{2}, \frac{6}{2}$

#### XLII. Genus ALPHEUS.

##### 69. ALPHEUS LOBIDENS de Haan.

*Alpheus lobidens*, de Haan, Crust. Jap. p. 179 (1839); Ortmann, Zool. Jahrb. v. p. 474, pl. xxxvi. fig. 13 (1891).

*Loc.* Pulau Bidan, Penang; Kelantan. Sixteen individuals from Pulau Bidan, three from Kelantan.

Length from 67 mm.

70. *ALPHEUS PARVIROSTRIS* Dana.

*Alpheus parvirostris*, Dana, U.S. Expl. Exp., Crust. p. 551, pl. xxxv. fig. 3 (1852); Ortmann, Zool. Jahrb. v. p. 483 (1891).

*Loc.* Great Redangs.

One small female with ova; length 14 mm.

71. *ALPHEUS ACANTHOMERUS* Ortmann, var. *INERMIS* nov.

Cf. *Alpheus acanthomerus*, Ortmann, Zool. Jahrb. v. p. 474, pl. xxxvi. fig. 12 (1891); Coutière, Notes Leyd. Mus. xix. p. 202 (1899).

*Loc.* Kelantan. Four females, three with ova.

These specimens present all the characters of Dr. Ortmann's species, except one, which is the presence (in the species) of a spine at the distal and inner under angle of the merus of the 1st pair. This spine is absent in the only one of these specimens in which the legs are present, and the difference is so marked that it seems necessary to regard it as probably varietal. In this respect it resembles *A. hippothoe* de Man; but may be easily distinguished from that species by the different proportions of the carpal joints of the 2nd pair, and by the presence of a small pleurobranch above the arthrobranch of the 3rd maxillipede (cf. Coutière *l. c.*). The outer surface of the hand of the large chelipede is smooth, but the inner surface is slightly granulated, with longish, somewhat scattered hairs.

Length: ♀ 19 mm., ♀ 15 mm., ♀ 13 mm., ♀ 12 mm.

72. *ALPHEUS CRINITUS* Dana.

*Alpheus crinitus*, Dana, U.S. Expl. Exp., Crust. p. 548, pl. xxxiv. fig. 8 (1852); Ortmann, Zool. Jahrb. v. p. 479 (1891).

*Loc.* —? A male; length 16·5 mm.

This specimen is without legs, but the same bottle contains also a single large chelipede and two small chelipedes. The spine on the under edge of the merus is situated at the middle of that edge and not at the distal angle.

## XLIII. Genus AUTOMATE de Man.

73. *AUTOMATE DOLICHOGNATHA* de Man. (Plate XXXIV. fig. 3.)

*Automate dolichognatha*, de Man, Arch. f. Naturg. iii. i. p. 529, pl. xxii. fig. 5 (1887).

*Loc.* Pulau Bidan, Penang.

A single small example; length 20 mm.

In the same tube with this specimen are a pair of chelipedes which I have little doubt belong to it. They conform to the Alpheid type, and present no remarkable features; but, as they were wanting in Dr. de Man's single specimen, I append a brief description and figure. They are unequal in size; the ischium, merus, and carpus generally similar in both (for differences *vide* figs. 3, 3a), quite smooth; ischium and carpus equal in length,

merus one and a quarter times the length of these joints. Carpus and merus each with a blunt tooth on the lower margins. The hands, too, are generally similar, but that of the smaller chelipede is more narrowed distally, owing to the greater obliquity of its lower margin; the fingers of both are short, but the dactyl of the larger hand is more curved than that of the smaller; a few scattered longish hairs are found on the fingers of both hands. The outer and inner surfaces of both carpi and propodi have a brownish-red basis of colouring (in formol) with white blotches or spots, the white parts appearing under a lens rather as an incrustation on the general surface.

#### XLIV. Genus ANCHISTUS Borradaile.

##### 74. ANCHISTUS INERMIS Miers.

*Harpilius inermis*, Miers, 'Alert' Crustacea, p. 291, pl. xxxii. fig. B (1884).

*Anchistus inermis*, Borradaile, Ann. Mag. Nat. Hist. (7) ii. p. 387 (1898)

Loc. Pulau Bidan, Penang.

A female with ova; length 24 mm. A note in the bottle with this specimen states that it was taken from the infra-branchial chamber of a large Gastropod.

#### XLV. Genus PALÆMON Fabr.

##### 75. PALÆMON CARCINUS Fabr.

*Palæmon carcinus*, Fabr. Ent. Syst., Suppl. p. 404 (1798); Ortmann, Zool. Jahrb. Syst. v. p. 700 (1891).

Loc. Singora, twelve males, ranging from 150 mm. in length. Kelantan, two males, length 90 mm. and 73 mm. Tale Sap, a male, length 104·5 mm.

*P. carcinus*, var. *lamarrei*. Loc. ?—A male of 43 mm. in length, in which it is noticeable that the inner lateral spines of the telson are longer than the tip of the telson itself. The tip is rounded, and probably broken short at some period, but in any case the lateral spines would be the same length as the tip. Carpus of 2nd pair as long as hand; surface of 2nd pair smooth, punctate, with short hair at intervals.

##### 76. PALÆMON EQUIDENS Dana. (Plate XXXIV. fig. 4.)

*Palæmon equidens*, Dana, U.S. Expl. Exp., Crust. p. 591, pl. 39. fig. 2 (1852); de Man, Weber's Zool. Ergebni. p. 453, pl. xxvi. fig. 36 (1892).

Loc. Kelantan, two males; length 100 mm. and 78·5 mm.

The larger male exhibits what is possibly a deformity of the fingers of the 2nd pair. The index of the right hand is broken off near the tip, but shows the regular light *concavity* of the lower border; that of the left hand, however, is only two-thirds the length of the dactyl and is moderately *convex* along its lower border,

its tip overlapping the dactyl when the fingers are closed. In both hands the dactyls are strongly bent—almost to a right angle—at their tips. The fingers in the other male are normal, the tips being slightly bent and just crossing.

The rostrum of the larger male is broken off near the carapace; that of the smaller bears 12 teeth above and 4 below: in both the first four teeth lie on the carapace. The latter is thickly covered with small spines. The tips of the fingers are (in formol) violet-coloured.

### 77. PALÆMON NIPPONENSIS de Haan.

*Palæmon nippensis*, de Haan, Crust. Japon. p. 171 (1839); Ortmann, Zool. Jahrb. Syst. v. p. 713, pl. xlvi. fig. 4 (1891).

*Loc.* Tale Sap.

Four adult males and two adult females; ten young specimens. Length from 37 mm. to 17 mm.

I have not seen specimens of the *P. acanthurus* Wiegmann from Brazil and Haiti, but, to judge from the description of this species, it is a form very closely allied to that of de Haan (vide *P. forceps*, M.-Edw. Hist. Nat. Crust. p. 397; v. Martens, Arch. f. Naturg. xxxv. p. 28; and *P. acanthurus*, Ortmann, t. c. p. 720). In comparing the specimens here dealt with with the different descriptions of the two species it appears that the chief specific differences may be arranged under four heads, thus:—

#### *P. nippensis.*

- i. 2–4 teeth on under edge of rostrum.
- ii. 2nd legs in adults with irregular small teeth; fingers hairy.
- iii. Telson with 2 lateral spines, of which the inner is about 5–6 times as long as outer; between the inner spines 2 feathered hairs.
- iv. *Distr.* Japan, China.

#### *P. acanthurus.*

- 4–7 such teeth.
- 2nd legs in adults with small teeth tending to be ranged in rows; fingers with thick pubescence.
- Inner lateral spines not more than 3 times as long as outer; between these several non-feathered hairs.

*Distr.* Brazil, Haiti.

I will take the first three points in order in their relation to these specimens; the distribution, of course, agrees with that of *P. nippensis*.

i. I give the tooth-formula of the rostrum in each case, giving that of the adults first:—

$$\frac{11}{6}, \text{two } \frac{11}{5}, \text{two } \frac{11}{4}, \frac{10}{5}; \frac{6+1}{5}, \frac{7+1}{4}, \text{three } \frac{6+1}{3}, \text{two } \frac{6+1}{4}, \\ \frac{5+1}{4}, \text{two } \frac{5+1}{3}.$$

From these formulæ it may be seen that the number of teeth on the under edge is variable as between the two species, and does not form any specific criterion. It also appears, and this does not seem to have been mentioned by earlier authors, that in the younger individuals the full number of teeth on the upper

edge is not always developed, there being an unarmed gap between the tooth near the tip and a varying number proximally.

ii. Two of these individuals only show small teeth on the 2nd legs; in one they are irregular (? showing a tendency to linear arrangement), in the other they are clearer and sharper, and show an obvious arrangement in lines. In regard to this point I quote from v. Martens (*l. c.*): "Scheeren . . . , Carpus . . . , beide bei erwachsenen Exemplaren mit Dornen besetzt, welche sich namentlich an der Beugeseite in einer regelmässige Längsreihe ordnen." Also Ortmann (*l. c.*): "bei den übrigen ♂ werden die Dornen immer kräftiger und zeigen eine für diese Art charakteristische Anordnung in Längsreihen." Both these descriptions refer to *P. acanthurus*.

Also the 2nd leg of this same individual is covered with a fine pubescence, which is dense and thick round the fingers in a little more than half of their proximal portion, a character recognized in *P. acanthurus*.

Here, then, it may be noted that in one out of sixteen chance individuals the 2nd leg presents the characters of that of *P. acanthurus*.

I will add that in one of the larger examples and in all the smaller the palm of the hands is slightly swollen.

iii. In all these specimens the inner lateral spines of the telson are from 4-5 times the length of the outer, and are relatively longer in the younger individuals. All the latter have two feathered plumes; but in the adults there is this difference, that the two biggest have six plumes, the two next in size four plumes.

I note here, then, that the inner lateral spines are generally as in *P. nipponensis*, but perhaps a little shorter relatively to the outer.

*P. nipponensis* and *P. acanthurus* live in fresh water: these particular individuals were captured in an inland sea, of which the upper end, I am informed, is quite fresh, the lower brackish to salt; unfortunately there is no record as to the part of the sea in which they were captured.

#### 78. PALÆMON PILIMANUS de Man.

*Palæmon pilimanus*, de Man, Notes Leyd. Mu. p. 181 (1879); id. Weber's Zool. Ergebni. p. 471, pls. xxvii. & xxviii. fig. 44 (1892); Ortmann, Zool. Jahrb. Syst. v. p. 735, pl. xlvi. fig. 9 (1891).

Loc. Aring, Kelantan, ten individuals; Beliuling River, one male. Length from 44 mm. to 30 mm.

Rostral formulæ:— $2 \delta \frac{13}{2}$ ;  $1 \delta$  and  $1 \varphi \frac{14}{3}$ ;  $1 \delta$  and  $1 \varphi \frac{11}{2}$ ; the rest  $\frac{12}{2}$ .

In Dr. Ortmann's figure of the telson the plumes between the lateral spines are shown as being a little shorter than the inner laterals; in these individuals they are longer, being in one instance (= the largest male) nearly twice as long. Three specimens only possess the 2nd pair of legs; in two of these the

fingers are longer than the palm, in the other the fingers are shorter and the hand less compressed.

79. PALÆMON SUNDAICUS Heller.

*Palæmon sundasicus*, Heller, SB. Ak. Wiss. Wien, xlv. 1, p. 415 (1862); Ortmann, Zool. Jahrb. Syst. v. p. 719 (1891); de Man, Weber's Zool. Ergebn. p. 437, pl. xxvi. fig. 35 (1892).

*Loc.* River Patalong.

A male and a female with ova. Length, ♂ 24·5 mm., ♀ 28 mm.

The 2nd legs are quite smooth, without any signs of teeth even at the base of the fingers.

80. PALÆMON LAMPROPUS de Man.

*Palæmon lampropus*, de Man, Weber's Zool. Ergebn. p. 493, pl. xxix. fig. 49 (1892).

*Loc.* Aring, Kelantan.

A large female with ova; length 63 mm.

A male, length 38 mm.; and a male, length 28 mm.

Some slight differences may be noted between these specimens and the species as described (*t. c. supra*). The rostrum in the female has 13 teeth only above, 5 below; in the larger male 12 only above, 4 below; in the smaller male it is broken off at the 9th, but the 1st tooth is seen to be a little separate from the rest. Moreover, while in the female the rostrum conforms to Dr. de Man's description in regard to its length, in the larger male it reaches quite as far as the scaphocerites, and considerably beyond the peduncle of the 1st antennæ.

Of the legs, the 1st pair shows this difference, that the carpal joint is quite twice as long, or even a little more than twice as long, as the hand. Only the larger chelipede of the larger male is present, and in this I note that the carpus equals the merus in length, and bears, in addition to the spinules on the upper and lower borders, a few similar spinules on its outer surface. There is also considerable grooving of the carpus and hand in this instance, but this, I have no doubt from its appearance, is due to mechanical compression only. The under edges of the carpi of the last 3 legs are armed with 10–12 spinules, of unequal size, and somewhat widely separate.

81. PALÆMON PAUCIDENS, sp. n. (Plate XXXIII. fig. 4.)

Cf. *Palæmon idæ* (Heller), de Man, Zool. Jahrb. Syst. ix. p. 767 (1897); and *P. cf. idæ* (Heller), Ortmann, Semon's Forschungsreise, v. i. p. 18 (1894).

*Loc.* Singora; numerous individuals of both sexes.

This species is a small form, allied to *P. idæ* Heller by the relative shortness and the slightly raised upper margin of the rostrum, by the greater length of the carpus of the 2nd pair relatively to the merus and chela, and the shortness of the fingers relatively to the palm.

The rostrum, however, bears fewer teeth above, and the actual

relative proportions of the joints of the 2nd pair are notably different.

The rostrum, then, is short and just reaches to the ends of the antennal scales, or even falls a little short of them.

On its under edge it bears 3-4 teeth; on its upper edge from 5-8 teeth, not including a very small tooth, which gives to the tip a bifid appearance. In most cases the upper line of these teeth is straight, but in a few cases it is markedly convex, owing to the teeth that lie over the eyes (teeth 2-4) being raised above the level of those before and behind them; and in yet other cases the upper line is curved, but not nearly so markedly. I summarize these characters in 50 individuals:—

	Upper line straight.	Upper line convex.	Upper line very moderately convex.
8 teeth....	1 specimen	1 specimen	0 specimen
7    " ....	7    "	0    "	4    "
6    " ....	21    "	2    "	5    "
5    " ....	8    "	1    "	0    "

Thus it appears that out of 50 individuals, 28 have 6 teeth, 11 have 7 teeth, 9 have 5 teeth, and 2 have 8 teeth; so that 6 teeth may be considered the normal number for the species, but a number tending to vary on either side of the norm; and similarly with the straightness of the upper line of the teeth, this character, however, varying only on one side of the norm. The outer maxillipedes reach beyond the antennal peduncles by the last joint or nearly the last joint; the 1st pair of legs reach beyond the scaphocerites (*i. e.* beyond the anterior angle of their outer border) by the last joint, the 2nd pair by the last joint and nearly half the carpus. The carpus of the 2nd pair is thickened at its distal articulation, and the proportions of the different joints are as follows (in an individual 40 mm. long):—

	Merus.	Carpus.	Palm.	Fingers.
Right leg....	5 mm.	7 mm.	3·25 mm.	2·25 mm.
Left leg ....	5    ,	8    ,	3·25    ,	2·25    ,

The greater length of the carpus of the left side in this specimen is, however, abnormal; in other specimens the proportions are the same on both sides. The last three legs increase in length from before backwards, the 4th pair reaching beyond the 3rd pair quite by the last joint, and the 5th pair reaching beyond the 4th pair barely by the last joint; the 5th pair, moreover, exceed the scaphocerites by the last joint and a third of the penultimate joint. All the legs are slender and quite smooth; the fingers of the 2nd pair are unarmed.

The internal antennæ are a little longer than the animal itself (47 mm.) and about half the length of the external antennæ. The telson ends in a sharp point, which is much shorter than the internal of the two lateral teeth, the external of which is very small.

Dr. Ortmann (*l. c. supra*) has given a very brief description of a female, which he considers to be a young form of Heller's species; and, from the description, I judge him to have been dealing with a form the same as that here under consideration.

While not denying the possibility of this form being the young of *P. idæ*, I still think there is a strong probability that it is a distinct species, on the ground of the following considerations. There are, in this instance, quite 100 individuals before me, all agreeing in the possession of characters distinct from those of the adult *P. idæ*; all were collected from the same locality, and there are no specimens showing the size or characters of the adult *P. idæ*; moreover, in several instances, the females bear numerous well-developed ova, these females ranging in length from about 25–35 mm. These facts, indeed, are not sufficient to create certainty; I have at times noticed, for example, the comparatively small size of ova-bearing females in a species in which a much greater size is the general adult condition, so that physiological puberty may not necessarily indicate an arrival at the morphological adult stage. But they do seem to point to a very strong probability that we are dealing here with a distinct specific form, and not merely with the young of an allied species.

#### XLVI. Genus *PENÆUS*.

##### 82. *PENÆUS SEMISULCATUS* de Haan.

*Penaeus semisulcatus*, de Haan, Crust. Jap. p. 191, pl. xlvi. fig. 1 (1839); Ortmann, Zool. Jahrb. Syst. v. p. 450 (1891).

Loc. Patani, six males and one female. Kelantan, two males. Singora, one male.

Length from 7·5 in. to 3·5 in.

Rostral formula in all but two  $\frac{7}{3}$ ; in these two, which are males, one has formula  $\frac{6}{2}$ , the other  $\frac{8}{3}$ . In the two (smaller) males from Kelantan the rostrum is markedly deflected downwards at its point, and does not curve up again as in those from Patani. The ridge of the 6th abdominal segment is transversely notched just behind the middle in one of these males.

##### 83. *PENÆUS VELUTINUS* Dana.

*Penaeus velutinus*, Dana, U.S. Expl. Exped., Crust. p. 604, pl. xl. fig. 4 (1852); Sp. Bate, 'Challenger' Maerura, p. 253, pl. xxxiii. fig. 1 (1888); Ortmann, Zool. Jahrb. Syst. v. p. 452, pl. xxxvi. fig. 6 (1891).

Loc. Pulau Bidan, Penang.

A young male; length 41·5 mm.

Rostral formula  $\frac{8}{6}$ . To the youth of this individual may perhaps be ascribed the two following points:—Firstly, the crest on the last four segments of the abdomen is very strong and *blunt*, that

part of it which lies on the first of these four segments being grooved on its upper surface, those parts which lie on the last three ending each in a very distinct tooth. Secondly, there are only three lateral spines on the telson, of which the posterior two are nearly three times as long as the first.

84. *PENÆUS CANALICULATUS* Olivier, var.? (Plate XXXIV. fig. 5.)

*Penaeus canaliculatus*, Oliv. Encycl. Méth. viii. p. 660 (1807); Sp. Bate, 'Challenger' Macrura, p. 243, pl. xxxii. fig. 1 (1888).

Loc. Pulau Bidan, Penang.

Two females and a male. Length: ♂ 58 mm., ♀ 59 mm., ♀ 50.5 mm.

The form of the petasma agrees with that of the species, but the form of the thelycum differs from that of the species and of the varieties figured by Spence Bate (*t. c. pl. xxxii. figs. 3 and 4*). The thelycum proper is nearly like that of the species, but there is an additional plate between the 4th pair of legs and no plate between the 3rd pair (*cf. fig. 5*). I have not given a distinct name to this form, as it has seemed to me that too little is known about the thelycum, and its possibly seasonal varieties within the same species, to justify the founding of a new variety on this character.

The telson in these specimens is armed laterally with three teeth, as in *P. caramote* Risso, and in the varieties *japonicus* and *australiensis* Spence Bate; but the absence of a strong spine on the 3rd pair of legs distinguishes it from *P. caramote*, and the form of the thelycum from Spence Bate's varieties.

85. *PENÆUS BREVICORNIS* M.-Edw.

*Penaeus brevicornis*, M.-Edw. Hist. Nat. Crust. ii. p. 417 (1837); Sp. Bate, Ann. Mag. Nat. Hist. (5) viii. p. 180, pl. xi. fig. 2 (1881).

Loc. Patani. A female; length 70 mm.

86. *PENÆUS* sp.? (Plate XXXIV. fig. 7.)

Loc. Patani.

A male, of 56 mm. length, whose specific position I cannot determine with any certainty; for, though agreeing remarkably with the last species (*P. brevicornis*), it still presents two features which would seem sufficient to separate it from the latter. Its general form and the shape of the petasma, which agrees with the figure given by Spence Bate of that of *P. brevicornis* (*l. c. supra*), led me at first to regard it as belonging to that species, but a closer examination showed the following notable distinctions:—(a) the rostrum barely reaches the tips of the eyes, instead of being just a little longer than these, and it is less raised in its proximal portion over the base of the eye; (b) the peduncles of the antennules reach to the ends of the antennal scales, and their flagella

are quite as long as the peduncles. In these respects it more resembles the *P. lysianassa* de Man (Mergui Crust. p. 291), but in that species the rostrum is even shorter, nor do the antennular peduncles reach the ends of the antennal scales; moreover, the petasma, though somewhat similar, is still distinctly different.

### 87. *PENÆUS AFFINIS* Sp. Bate.

*Penaeus affinis*, Sp. Bate, Ann. Mag. Nat. Hist. (5) viii. p. 179, pl. xii. fig. 6 (1881).

*Loc.* Pulau Bidan, Penang.

A female; length 38 mm.

The apex, *i. e.* anterior edge, of the heart-shaped thelycum in this specimen is, as it were, frayed out into very minute teeth, only visible under a lens.

### 88. *PENÆUS MUTATUS*, sp. n. (Plate XXXIV. fig. 6.)

Cf. *Penaeus monoceros* (Fabr.), de Man, Weber's Zool. Ergebni. p. 513, pl. xxix. fig. 54 (1892); and *P. lysianassa*, id. Mergui Crust. p. 290, pl. xix. fig. 1 (1888).

*Loc.* —? A male and a female.

This species, although showing close affinities with *Penaeus monoceros* by its general structure, yet presents in the male certain modifications (in the form of the petasma, 5th pair of legs, and telson) that closely resemble similar modifications in *P. lysianassa*; while the thelycum in the female, though very like that in *P. monoceros*, yet again shows a modification in structure which, so far as I know, has hitherto been described in only one other species.

In regard to its general structure it agrees, as I have said, closely with *P. monoceros*, and the description given by Dr. de Man (*t. c. supra*) for a female of that species applies equally well to these two individuals; with the exception that the legs are shorter, so that the 1st pair reach barely to the ends of the eye-stalks (*i. e.* the eyes not included), the 2nd pair reach only to the middle of the scaphocerites, the 3rd only to the tip of the spine at the outer distal angle of the scaphocerites, the 4th are as long as the 1st; the 5th, however, are *longer* than the 2nd by their last joint.

The petasma is remarkably like that in *P. lysianassa*, and so peculiar that I refer to the figure for its structure; it appears to differ chiefly in the structure of its anterior surface, which, instead of bearing two pairs of dentiform prominences, one at its base and one at its distal extremity, bears one pair at the base directed towards the ventral surface of the abdomen, and just above this pair another pair of low, bluntly triangular, prominences directed inwardly towards each other (*vide* fig. 6 b).

The thelycum is shaped much as in *P. monoceros* (*cf.* de Man, *t. c.* fig. 54 a; Ortmann, Zool. Jahrb. v. pl. xxxvi. fig. 3 b), with some slight differences best brought out by the figure. But, in addition to this, there are also a pair of small plate-like structures which abut against the outer sides of that grooved part of the thelycum which extends forwards towards the

bases of the 4th pair of legs, which structures are formed as a backwardly directed process of the coxae of the 4th legs, and are freely movable with them, as opposed to the fixity of the thelycum proper. A possibly (?) and see below) analogous structure has been described by Spence Bate (Chall. Macr. p. 247, pl. xxxii. fig. 4) in the var. *japonicus* of *P. canaliculatus*, as to which he says: "A large thelycum . . . . which extends forwards as far as the base of the antepenultimate pair of periopoda, whence project two large leaf-like appendages." In this variety they are, however, very large and foliaceous, and so quite different in appearance to the small plate-like structures in the present species; moreover, Spence Bate adds the following remark to this description: "They appear to be connected with the internal organs by means of foramina in the floor of the capsule, and have no connection whatever with the 5th pair of periopoda." I can find no trace of any connection between the internal organs and this structure in the present instance—the structure being, as I have said, freely movable and apparently nothing more than an outgrowth of the coxa of the 4th pair instead of the 3rd; its analogy, therefore, in the two forms seems doubtful.

#### XLVII. Genus SICYONIA M.-Edw.

##### 89. SICYONIA LANCIFER Olivier.

*Palæmon lancifer*, Olivier, Encycl. Méth. vi. p. 664 (1807); Ortmann, Zool. Jahrb. Syst. v. p. 453 (1891).

Loc. Pulau Bidan, Penang.

A male; length 40 mm.

#### XLVIII. Genus STENOPUSCULUS Richters.

##### 90. STENOPUSCULUS CRASSIMANUS Richters.

*Stenopusculus crassimanus*, Richters, Beitr. z. Meeresfauna d. I. Maurit. u. Seychellen, p. 168, pl. xviii. fig. 27 (1880); de Man, Arch. f. Naturg. liii. i. p. 565 (1887).

Loc. Pulau Bidan, Penang.

A male and four females (two with ova). Length from 12 mm.

*Note on the Genus Actæopsis Lanchester.*

(*Vide* P. Z. S. 1900, p. 741.)

In this note I have corrections to make in regard to both species and genus; and I will take the species first.

I. In the paper cited above I referred the specimens on which this genus was founded to a form that Mr. Borradaile was describing at the same time under the name *Carpilodes pallidus*. In doing this I erred, for the two forms are quite distinct, as may be readily seen on comparing the two figures (*l. s. c.* & Borr. P. Z. S. 1900, pl. xl. fig. 3). It is due to Mr. Borradaile to say that this mistake, which I regret exceedingly having made, was entirely mine.

II. I have since found that the name *Actæopsis* has already been used to designate a fossil genus (Carter, Q. J. Geol. Soc. liv. 1898), and must therefore be dropped. Under these and the above circumstances, I propose to rename the form *Actites erythrus*<sup>1</sup>.

Although, as Dr. de Man has kindly pointed out to me in correspondence, this form is remarkably like the *Carpilodes lophopus* of Alecock (Journ. As. Soc. Bengal, 1898, p. 84, and Illustr. Zool. 'Investigator,' 1899, pl. xxxvi. fig. 2), I still feel that I was right in separating it from the genus *Carpilodes*.

It most obviously resembles *Carpilodes* in the smooth and even lobulation and grooving on the carapace; but it also most obviously differs from that genus in its prominent front, shape of lateral margins, and carinated legs. At the time I also saw what I thought were palatal ridges, but, as Dr. de Man has since pointed out to me, these are not true palatal ridges, but the "usual crests situated at the antero-external angles of the endostome, as in other species." Even so, however, the points I have enumerated above would still prevent me from considering the species as a *Carpilodes*, the prominence of the front and the shape of the lateral margins contribute to a *facies* so remarkably unlike that of a true *Carpilodes*. As to whether Major Alecock's species should also be included in my genus, I am unwilling to express a definite opinion, as I have not seen the type specimens; but, judging from the description and figure given, it would seem to be not unlikely.

#### EXPLANATION OF THE PLATES.

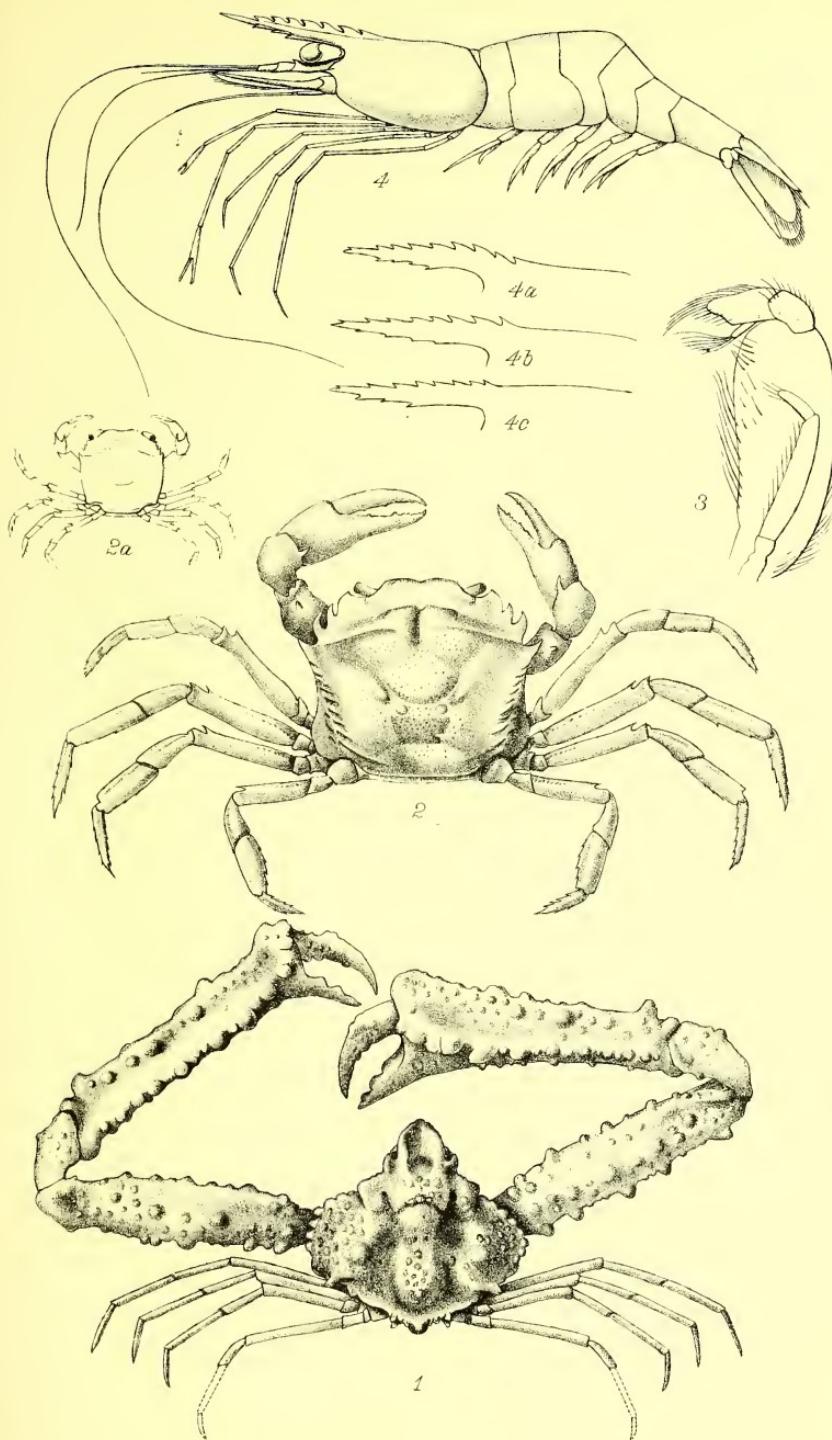
##### PLATE XXXIII.

- Fig. 1. *Lambrus lippus* (p. 536), dorsal view.
- 2. *Potamon improvum* (p. 546), dorsal view.
- 2 a. Young from beneath abdomen.
- 3. *Pinnotheres socius* (p. 551), 3rd maxillipede.
- 4. *Palæmon paucidens* (p. 568), from left side.
- 4 a, 4 b, 4 c. Different types of rostrum.

##### PLATE XXXIV.

- Fig. 1. *Caridina gracillima* (p. 560), from right side.
- 2. *Callianassa secura* (p. 555), from right side.
- 2 a. Front of carapace.
- 3. *Automate dolichognatha* (p. 564), larger chelipede.
- 3 a. Smaller chelipede.
- 4. *Pulæmon evidens* (p. 565), abnormal chelipede.
- 5. *Penæus canaliculatus* var. ? (p. 571). Thelycum.
- 6. *Penæus mutatus* (p. 572). Petasma, anterior and posterior views.
- 6 a. Thelycum.
- 6 b. Anterior, 6 c. Posterior views of petasma.
- 7. *Penæus* sp. (p. 571). Petasma, anterior and posterior views.
- 7 a. Anterior, 7 b. Posterior views of petasma.

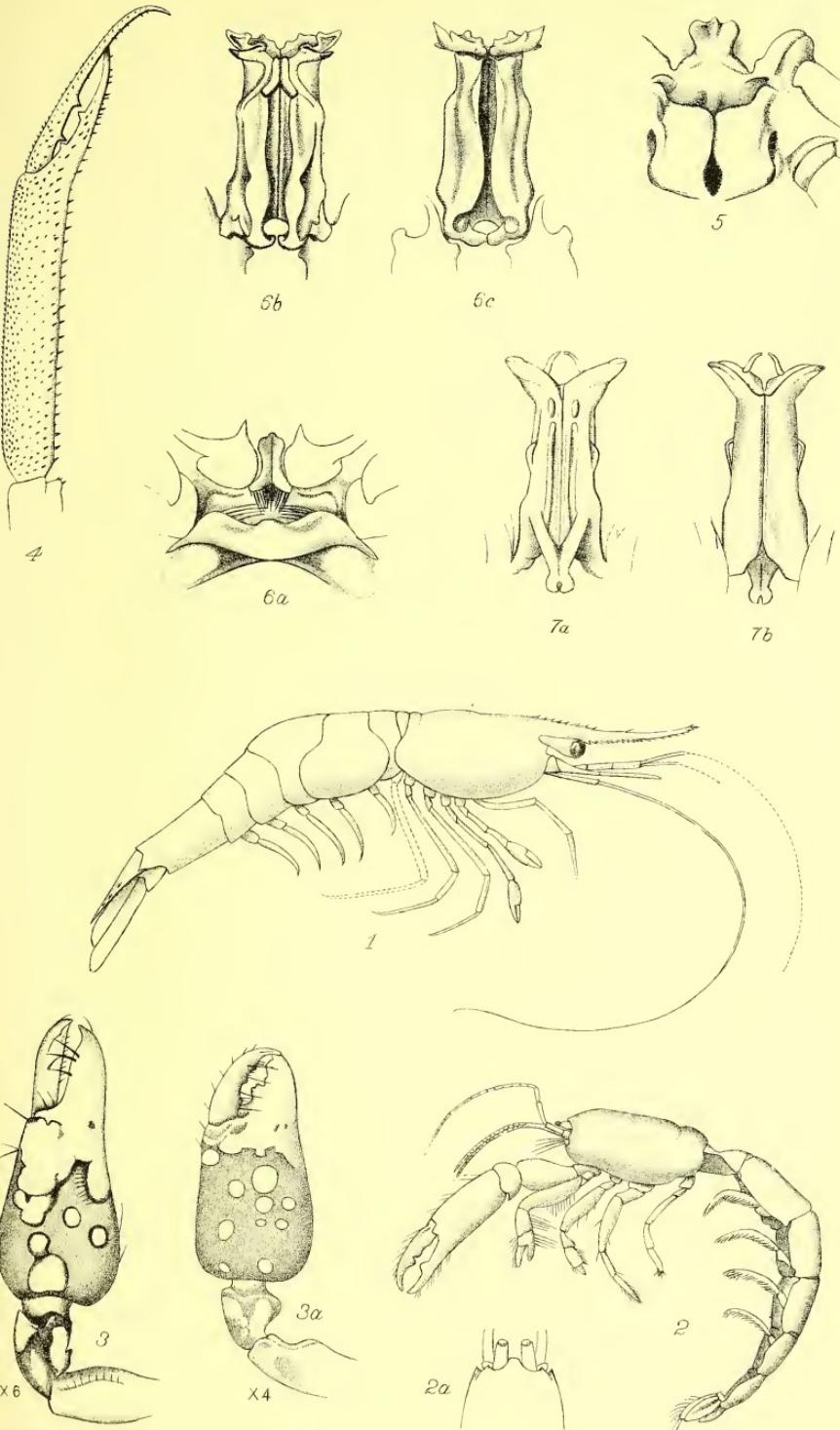
<sup>1</sup> *Actites*, = "a dweller by the shore," will also, I hope, indicate the close position of this genus to the *Actæopsidae*.



*Edwin Wilson, Cambridge.*

CRUSTACEANS FROM THE MALAY PENINSULA.





*Edwin Wilson, Cambridge.*

CRUSTACEANS FROM THE MALAY PENINSULA.

